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OUISIANA CONSERVATION REVIEW

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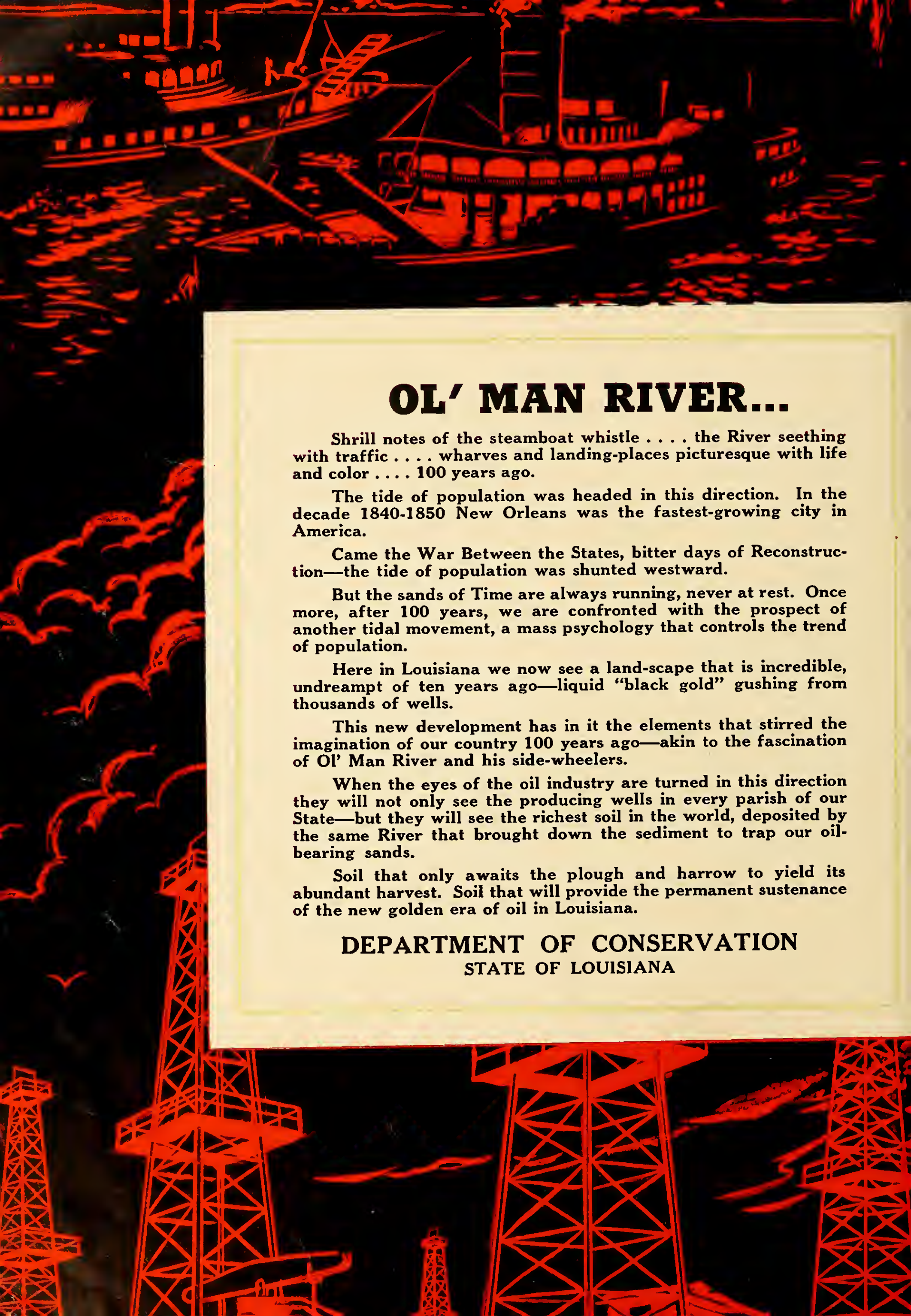
SUMMER, 1938



OL’ MAN RIVER...

Shrill notes of the steamboat whistle . . . . the River seething with traffic . . . . wharves and landing-places picturesque with life and color . . . . 100 years ago.

The tide of population was headed in this direction. In the decade 1840-1850 New Orleans was the fastest-growing city in America.

Came the War Between the States, bitter days of Reconstruction—the tide of population was shunted westward.

But the sands of Time are always running, never at rest. Once more, after 100 years, we are confronted with the prospect of another tidal movement, a mass psychology that controls the trend of population.

Here in Louisiana we now see a land-scape that is incredible, undreampt of ten years ago—liquid “black gold” gushing from thousands of wells.

This new development has in it the elements that stirred the imagination of our country 100 years ago—akin to the fascination of Ol’ Man River and his side-wheelers.

When the eyes of the oil industry are turned in this direction they will not only see the producing wells in every parish of our State—but they will see the richest soil in the world, deposited by the same River that brought down the sediment to trap our oil-bearing sands.

Soil that only awaits the plough and harrow to yield its abundant harvest. Soil that will provide the permanent sustenance of the new golden era of oil in Louisiana.

DEPARTMENT OF CONSERVATION
STATE OF LOUISIANA

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SUMMER, 1938

The front cover of this issue is reproduced from a photograph by Hermann B. Deutsch of the bass angler, Jonny Mathes, in action.

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EDITORIAL

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Telling Louisiana's Story To The Legionnaires

Besides the regular mailing list of 26,500 copies of the LOUISIANA CONSERVATION REVIEW, 10,000 additional copies of this issue are being printed for distribution at the annual convention of the American Legion, opening at Los Angeles on September 19th.

The Department of Conservation will also be represented by an elaborate exhibit, which will emphasize the natural resources and industrial opportunities of the State. There will be two of the Department's engineers on hand throughout the convention, to answer any questions relating to these resources and their use as raw materials in Governor Leche's program for the attraction of new industries.

From the numerical viewpoint the Legion convention is an outstanding gathering of American citizens—probably there will be 100,000 World War Veterans and their families in attendance at Los Angeles. What is more important, however, is that the delegates will constitute a true cross-section of American life to-day—drawn from the ranks of agriculture and industry, big and little business, capital and labor.

These veterans are now in the prime of life—far enough advanced along the highway of life to have the benefit of mature judgment in the recognition and selection of opportunities for enterprise and investment.

With this in mind Commissioner William G. Rankin made a special effort to see that Louisiana's exhibit at the convention should visualize in the most effective manner the natural resources and industrial expansion of the State.

Louisiana's Invitation to Industry

In granting a 10-year exemption from taxes to new industries Louisiana was not motivated by purely unselfish or altruistic reasons—her legislature was thinking that both Louisiana and industry might work together to their mutual profit.

If the industrialization of Louisiana were an artificial development, without the basic factors essential to the continued expansion of industry, such a subsidy might conceivably prove a mirage, leading to the downfall of capital and management, to the distress of labor.

But here in Louisiana there is a remarkable conjunctivity of certain conditions that are not duplicated elsewhere—

For example—

(1) the greatest variety of natural resources, which serve as the raw materials for industry, to be found in America—
(2) cheaper fuel for industry from one of the largest reserves of natural gas in America—
(3) cheaper transportation for raw materials and fabricated merchandise over the most complete system of inland waterways in America—
(4) accessibility to the population centers, which are gradually moving southward and westward, giving assurance of a continued consumer demand for many years to come—
(5) an equable climate with a year-round season for work and play in the open—
(6) a labor market as yet unspoiled by the infusion of alien agitation—
(7) the background of comfortable and congenial living conditions, recreation and educational facilities that make for a more contented family life.

All of these conditions will appeal to the alert business man or manufacturer, seeking a new location for his factory, assembly plant or branch office.

Agriculture vs. Industry

We like to think of agriculture as the backbone of our nation, to feel that the tillers of our soil and their products rank at the top of our national economy, but let us examine the picture more closely. Let us face the fact that the South, which has always been an agricultural section, is rapidly becoming industrialized.

We should also recognize the fact that the South has never been the master of raw cotton, but its slave; that for more than 100 years it has sold its chief product in world markets, at the world's own price, but at a sacrifice of its own people. That is at least one explanation of our impoverished tenant farmers and share-croppers; that is why the President tells us the South is the nation's No. 1 economic problem.

But the face of the South is now turned towards industry, and in no other state does this apply with greater force than in Louisiana.

It would indeed be an ideal situation if we might retain the best of agriculture—the production and marketing of our farm products on a really scientific basis—and at the same time acquire the advantages of industry, for it is not to be denied that the mass production of industry, and the profit incentive, have been responsible for the highest standards of living the world has ever known.

In the case of our industrial workers it would surely be a sort of Utopia if each of them could cultivate his own tract of land, if no more than a truck garden, which would divide his time between the factory and the farm. With the tendency towards shorter and shorter hours in industry this would be one solution of the problem of the worker's leisure hours and also the problem of unemployment.

For the past 40 years or more there has been a continuous drain of our farm population to urban centers, and yet through the increased efficiency of farm machinery there has been a continuous increase in farm production. Our country is geared to over-production, which means that our problem is one of distribution and not of production.

■ Swamp scene on beautiful Weeks' Island, Iberia Parish, Louisiana.

Will Colonization Follow Our Oil Development?

By

WILLIAM G. RANKIN, Commissioner
Department of Conservation

There is a saying in the oil industry that coastal Louisiana is no place for the tenderfoot. By this it is meant that the deep drilling of this region, and the expensive preparations that precede the actual drilling, entail a cost that can hardly be financed on a shoe-string.

This is undoubtedly true of the oil operator, but we all know that there are many related enterprises of the oil business that attract the most diversified interests—the scouting and leasing of prospects, trading in royalties, merchandising of supplies, etc. These interests may work with smaller capital, but in the aggregate they will be a tremendous factor in the further development of South Louisiana.

There is one phase of this development that I am particularly anxious to emphasize. While we probably have the greatest petroleum reserve per square mile of any state in the Union, it is inevitable that in time this reserve will be exhausted, never to be revived. On the other hand, it is possible to conserve our timber and soil resources, to renew their vitality and restore their productivity.

It is therefore incumbent on us to so utilize our oil development that it will tie in with the conservation of our soil and timber resources. It is an interesting phenomenon of Nature that the marine depositions of the Mississippi River, from which our oil and gas production is obtained, have likewise provided us with the alluvial silt that is the richest soil in the world.

Notwithstanding the richness of this soil the settlement or colonization of our farm lands has been a slow process. It was thought that the old plantation system would yield to the smaller units of prosperous farmers, such as we have in the Middle West; but it appears that this is a process not so susceptible to artificial stimulation.

The Changing Picture in Louisiana

But now the picture is changing. We see our marsh-land, even our water bottoms, literally dotted with derricks that have arisen almost overnight—in nearly every parish of Louisiana we see exploration followed by production; we see the income of this section swelling from oil royalties, from the labor of oil operations and related sources.

We also see new faces, which means that to-day Louisiana is facing a renaissance that could hardly have been effected by other means in a hundred years. We have only to read our history to realize that this is true.

Longfellow-Evangeline Memorial State Park, St. Martinsville, Louisiana.

One hundred years ago, as a consequence of the national interest in Mississippi River transportation, New Orleans was the fastest growing city of the country and the State of Louisiana was booming. Then came the War Between the States, and the economic devastation of Reconstruction days, when the clock of progress seemed to stop, only to start up with the turn of the century.

Well, we are now confronted with another opportunity, even more exciting and stimulating than River transportation. We now have an Eldorado of our own that will be the magnet to attract new money, new blood, new life; and after the high tide of our golden age of oil begins to ebb we should see a permanent investment in our rich agricultural lands and the industries which they will support. We should look forward to that day and plan to that end.

The Reclamation of Our Swamp-Lands

Theoretically the conservation of our natural resources is an intelligent step forward in our process of evolution, perfectly logical and obvious; but in practice it is not so simple.

I am thinking of the proposal to reclaim the wet lands of South Louisiana, particularly those contiguous to the City of New Orleans, with the object of eradicating the pesky mosquito and enhancing the potential value of these lands.

It would appear that there could be no possible objection to such a progressive undertaking; but when we examine the project from the point of view of conservation we see that it is at least debatable.

These swamps are the habitat of a considerable proportion of our wildlife. In their primitive state they afford a refuge for fish and game, wild life of every description. We can readily understand that their conversion into farm lands will not appeal to the sportsman, but on the other hand it would certainly be foolish for us to attempt to impede the progress of civilization, which is chiefly concerned with the greatest good to the greatest number of our people.

As we contemplate the vast areas of our marsh-land that will still remain a refuge and sanctuary for our wildlife, we might not hesitate to endorse such a project if we were not familiar with the gradual encroachment of agriculture and industry in these areas. A large proportion of the State of Louisiana was built up by deposits of the Mississippi River, draining thirty-two states of the Union of their rich silt to form the top soil of our land. When cultivated this alluvial soil will support the densest population on the American continent—in the inexorable changes of time it will be cultivated.

The question with the conservationists to-day is not whether they should stand in the way of this mechanical transition—but rather, how to make the best of it.

The Special Interest of the Sportsman

In the State of Louisiana there are over 700,000 acres dedicated as wildlife sanctuaries, fish and game preserves and State parks. Plans for any comprehensive drainage project should give due consideration to the continued protection of our wildlife. While the drainage of our swamps and their conversion into farm lands may circumscribe to a certain extent the sportsman's peregrinations, the more intensive cultivation of our lakes and streams, as feeding and resting grounds for wildlife, will help to compensate for the curtailment of his activities in the drainage districts.

Further, the State should continue to extend its parks and wildlife preserves, as it has recently done in the case of the Tchefuncte Park and Conservation Reservation, so that in the years to come there will be recreation grounds for a greatly increased population.

While the drainage of our swamps may mean the loss of some revenue from fur-bearing animals, this is not such an important consideration if we are to substitute prosperous farm families for the ubiquitous mosquito.

The accelerated development of the oil industry will undoubtedly make Louisiana one of the richest states of the Union; it will also generate the power for the continued industrialization of the State. It is important that agriculture should keep pace with industry; to attract the investment of substantial farmers it is necessary to reclaim our rich wet lands and eradicate the mosquito.

The conservationist is primarily a good citizen, interested in the betterment of conditions affecting the lives of our people—he is not opposed to drainage or any constructive enterprise, provided the protection of our wildlife is given the consideration it deserves.

The Future of This Fisherman's Paradise

There is a good deal to be said for angling in mountain streams, wading knee-deep in the rushing torrent to cast one's fly in some shadowed pool, but after all the true sportsman takes his fun where he finds it, whether in mountain stream or low-land bayou.

When we come to analyze all of the factors that contribute to ideal fishing conditions, we can hardly escape the conclusion that Louisiana is indeed the fisherman's Paradise. Nor is this merely a pretty slogan, one of those tid-bits of self-adulation with which communities as well as individuals feed their inflated ego. It is more than that—it will stand up under critical analysis.

In other states the scarcity of fishing waters and the increasing number of Isaac Waltons has made the problem of restocking streams one of paramount importance. Here in Louisiana Nature has been so bountiful and prolific that our anglers are generally assured of a good day's sport at any season; but we must surely look forward to a considerable increase in our population, sixty per cent of which now lives in urban centers.

With the continued industrialization of our state we may anticipate an even greater congestion and we will have to provide more extensive facilities for recreation that will tax the present capacity of our fishing grounds. It is indeed necessary that we look forward to their gradual depletion unless there is a more scientific and intensive re-stocking of our fishing waters.

The Visiting Angler

The people of these United States are becoming more and more travel-minded; the highways are cluttered with autos and trailers on the move. It is estimated that Louisiana now derives $40,000,000 yearly from its tourist trade. As I see it one of our chief sources of attraction in the future will be our fishing grounds. Our resident anglers may not be expected to view with equanimity the intrusion of these visitors in their favorite haunts, but as long as there are enough fish to go around it will not be an unmixed blessing. For every fish that is taken from our waters we will create a certain amount of good will, the prospect of a satisfied customer, of a permanent resident or investor.

As our swamp-lands are cleared and our highways extended, our fishing waters will become more and more accessible. Our vast net-work of inland waterways, our lakes and bays and bayous, will be stocked with those fish that are best adapted to local conditions, and anglers from all parts of the country, finding the fishing waters of their own states exhausted or overcrowded, will flock to this fisherman's Paradise. This is one of those potential assets that should not be left to haphazard development, but should have the benefit of scientific study and planning for the future.

Department of Conservation Begins Investigation of Surface Waters of Louisiana.

Commissioner Wm. G. Rankin entered into an agreement with the Water Resources Branch of the United States Geological Survey to investigate the surface waters of Louisiana.

This work consists of gauging the daily flow of water in the numerous streams of the State. This investigation will be on a continuing cooperative basis. Data on the volume and quality of the various streams of the State are necessary in the establishment of many new industries for control of pollution and in studies of fish propagation in the State.

Information to be gathered by the survey is essential in the construction of dams, reservoirs, bridges, fish hatcheries and similar conservation problems.

The Public Works Administration has allowed funds for the construction of some permanent automatic stream gauging stations in the State. These stations will be located along small streams where such streams are subject to rapid change in depth. Stations will also be operated on some of the larger streams of the State; such streams will be gauged twice a day.

Prior to the establishment of this survey, only the larger streams such as the Mississippi, the Red, the Atchafalaya and the Ouachita Rivers were regularly gauged only for major flood protection and navigation purposes.

This survey will furnish much needed data in various localities of the State where dams, reservoirs, flood control and other local projects have been proposed. It will also furnish data which is needed for municipal water supplies.

Moss draped oaks on Avery Island, Iberia Parish, Louisiana.

Photos by Hermann B. Deutsch

■ **With its thousands of miles of lakes, bays, bayous and other inland waters, and their varied species of fishes, Louisiana is indeed the angler's Paradise.**

Eh, le Bass!

By

JONNY MATHES

Because of its almost universal distribution throughout Louisiana waterways, from the brackish bayous of the coast to the spring-fed and swiftly running streams of the northern hills, the black bass is one of the favorite food and game fishes of all the state. He is as much at home in Cross Bayou near Shreveport as he is in Bayou Sauvage below New Orleans. And wherever encountered, he's a first-class finny fighting man, always ready for battle, with or against odds.

To be specific, there are two of him, readily distinguishable once the particular characteristics of each classification have been seen. One is the largemouth black bass, the other the Southern smallmouth. In both the general coloration and body build is the same, and both are popularly known in our section of the United States as "green trout." Elsewhere he is called the "bronze back", the "linesides", and a score or more of other popular names.

There are likewise a number of other members of the bass classification in our waters. There is, for example, the calico bass, almost indistinguishable from the sac-a-lait or crappie; the war-mouth bass, commonly referred to as the goggle-eye perch. But our concern is primarily with the black bass, since because of his numbers, his wide distribution, his gameness—yes, and his excellent table qualities—is perhaps the most popular fresh water prize sought by Louisiana's anglers.

There are no set rules for bass fishing. Where Mr. Bronze Back is concerned, you can throw the rule book into the nearest and handiest trash can, because rules are something he himself pays no attention to in any way. There are days when he refused the most enticing bit of bait, but will go ravenously for one special pattern of fly. There are other days when he turns up his blunt nose at anything but a plug. And other days still, as every devotee can testify, when he will take nothing whatever.

However, there is undoubtedly more enjoyment for the fisherman, as well as a better sporting chance for Mr. Bass, when the angler uses a fly-rod. Even when the bass are not striking, the fly fisherman is always "shooting at par" in trying to place his lure at one particular designated spot. And to be sure, he never knows, when a bronze-and-green torpedo will come boiling up to smash the gaudy offering of cork and feathers that has been so cunningly dropped to lure him from his safe lair.

It is therefore with reference to fly-casting that I offer these few suggestions. They are not rules. They are merely what the experience of years has made me feel contributes most to angling enjoyment. The first suggestion is that the rod be light—a five or five-and-a-half ounce rod for preference, with a light, single-action fly rod reel. In this connection, it is important that fly-rod and reel be regarded as a sort of unit. The reel which will balance beautifully with one rod, so that its weight is unnoticeable, may wear out the wrist of the user on another rod, which it does not fit, even though the combination be an ounce lighter.

Casting the Line

The next important item—fully as important as the rod itself—is the line. Remember that in bait casting, the plug is cast out like a stone from a sling, carrying the line from the reel with it. In fly-casting, however, it is the line that is cast, and the line that carries the lure with it. A properly made fly-line is a beautifully precise instrument, in the hands of a skillful user. Our experience has been that an E or D level line is the one most nearly ideal for the type of fishing usually encountered in our Louisiana waters, and may be used with either a synthetic or real gut leader. Naturally, the latter (which is not gut at all, but the treated and fine-drawn silk gland of an adult silk-worm) is to be preferred to the synthetic imitations, but the latter will serve quite as well, and are much less expensive, particularly in these days, when the people of Spain are occupied with other matters than silkworm raising.

As for the type of lure or fly, that must be left to the individual fisherman's fancy. Some swear by one particular pattern, others by another. Some insist on a floating or "dry" fly, or cork-bodied bug, while others use a submerged hair or feather fly with a tiny metal spinner. By long odds, the floating lure is to be preferred from the point of view of enjoyment, since it gives the angler an opportunity actually to see the smashing strike of his prey.

In general, there are two types of floating bass bugs. One of these imitates, so to speak, a struggling insect; the other a crippled minnow. In both cases some of the patterns are silent, and are excellent in smooth water; while others have popping contours, and are to be preferred for disturbed or ruffled water. But so far as preference goes, the writer is perfectly willing to hear suggestions from the readers.

Among the most popular patterns it is interesting to note that two are the products of New Orleans angling enthusiasts. One is the Nelson popping minnow, designed and manufactured by Lester Nelson, a musician by profession; the other is the so-called Parker bug, designed by John M. Parker Jr., a cotton factor, and manufactured by the E. H. Peckinpaugh company in Chattanooga. Nelson has devoted himself seriously to the production of effective bass bugs, and is the originator of a number of other striking designs, notably a winged popping bug, and a startlingly natural frog.

Along with a judicious selection of bucktail and other under-water feather lures, will make it possible for any fly fisherman to equip his tackle box with a full line of "flies" to meet almost any given condition of weather and water in pitting wits against the wily black bass.

A Game Contest

It is hard to put the "kick" of fly-fishing into words. The skiff or pirogue glides noiselessly along. A deft flick sends the fly into an opening among the hyacinth pads, or the shadowy eddy beneath an overhanging bush. Suddenly the water explodes as Mr. Bass makes the smash that is intended to stun his prey in the event the gaping mouth does not engulf it at the first trial. A slight back movement of the wrist, beautifully timed, sets the hook, and the battle is on. Fighting like the game battler he is, Mr. Bass tears away for freedom. Better let him have his way for a time. You can't horse that two pounds of TNT in as you would a pet goldfish.

And then he leaps, anywhere from two to five times his own length out of the water, an iridescent flash in the spray of his own jump, shaking his great head from side to side as he turns over and over, landing on his back when he hits the water once more. Again and again he flings himself up into the air from the water, just as he is shown doing on the cover of this issue of the Conservation Review—a photograph of the landing of a bass by this writer, and taken by his fishing companion of that occasion, Hermann B. Deutsch.

But nothing made of flesh and blood can continue to spend itself as fiercely as that for very long. Mr. Bass begins to tire. He tries to sulk, to reach the bank, to sound for the

■ **The author of this article is shown with his modest string of bass, after having thrown back the smaller ones—a test of the true sportsman.**

When this game fellow strikes the angler's fly it means a battle royal—real sport is always assured the bass fisherman.

bottom. And as you bring him in, both of you will find out whether or not you're a sportsman. If he's of legal size, and you have no fish in the creel, okay. But if you have a half dozen bass already, that's the time we'll find out whether you're as much of a gallant gentleman as your weary adversary; for in that case you'll release him carefully, so that he may delight some other sportsman some other day. And if, on the other hand, you're Mr. Fish Hog, who delights in boasting that he brought in a hundred bass or so, or a dozen bass, when you can't possibly use more than four for the table, why that's your privilege, too. But don't do your boasting where real sportsmen can hear you. You might be surprised. Disagreeably, too.

* * *

Extension of the Duck Hunting Season

The duck hunting season this year will be extended from 30 to 45 days, according to the new regulations just issued by the Department of Conservation, and this year the hunter may have in his possession two days' bag limits instead of one. That is, not more than two days' bag limit of ducks and geese may be transported in one week.

It is explained that the regulations governing the hunting of waterfowl have been liberalized this season in several respects, not with the idea of materially increasing the kill of birds, but "to take out some of the headaches." Increase in the duck population gives the opportunity for this liberalization in the interest of fair distribution of the hunting privileges that are available.

The season has been lengthened to 45 days to provide a period during which there may be opportunity in all sections of the State for some hunting when the birds are there.

The two days' bag limit is designed for the fellow who has to travel a long distance to hunt and has only a few days in which to do it, so that he will be on an equal footing with the fellow who lives near the shooting grounds.

Canvasbacks, redheads, buffleheads and ruddy backs have been fully protected for the past two years. A great many hunters have shot these birds by mistake. This year, in order to allow for a margin of honest errors and in many instances to really conserve the birds, the regulations permit a hunter to have three of these species in the aggregate in his bag without being a violator. Although the situation of these particular species of ducks is better now than it has been for the past two years they still are in need of special protection, and every effort will be made to impress upon the hunter the advisability of avoiding the killing of these ducks whenever possible.

In the past few years there have been drastic restrictions on duck and other waterfowl hunting. As a result there has been a noticeable annual increase in waterfowl. This year the prospects are the best they have been for a long time.

There is still a great need for caution and restraint, however. No baiting is allowed. The use of live decoys is prohibited. There is a three-shell limit on repeating guns, and the bag limit on ducks is still 10 a day. Next year's regulations will depend on the proportionate kill of waterfowl this season.

The hunting for ducks, geese, coots and snipe season extends from November 15 to December 31, both dates inclusive; for doves from October 15 to December 31; for rails and gallinules, from November 1 to January 31; for woodcock, from January 1 to January 31.

Ducks, geese and coots may be hunted from 7 a. m. to 4 p. m. only.

Hunters of migratory waterfowl must have a state hunting license and a Federal duck stamp.

* * *

How Fast?

That duck that gets away or was missed by your shot when you go hunting ducks will not be flying 150 miles an hour. Do not use the speed of that duck as an alibi for having missed it, for the fastest duck on the wing cannot exceed 72 miles per hour.

* * *

Minerals on Private Property

The Louisiana Department of Conservation is directed by law to protect, conserve and develop the natural resources of the State regardless of whether they are on public or private property. The Department is required by law to make rules and regulations to prevent the waste or wasteful use of the mineral resources of the State.

* * *

Gas Blow-Out Costs

Estimates of the cost of closing the recent Texas Company blow-out in Vermilion Bay range from $125,000 to $150,000, which does not include the loss of twelve billion cubic feet of natural gas and the possible recovery of oil and by-products from this gas. Nor does it include the loss of two lives and the injury suffered by H. L. Patton, chief of the blow-out fighters.

* * *

Slash Pine

Slash pine grows naturally in lower St. Tammany, Tangipahoa and Livingston Parishes.

Mother Nature Rebels

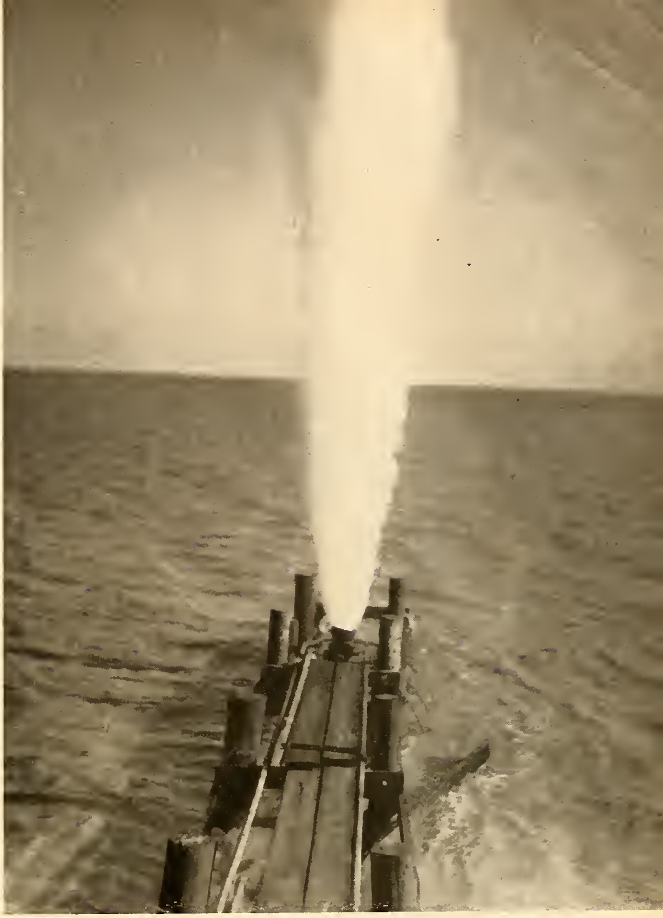
But Man's Bravery and Ingenuity Subdue Runaway Well After Terrific Struggle for 45 Days.

By
W. F. Chisholm*

* * *

Illustrated with photos by Donald E. Fuellhart*

* * *



■ **Attempt to control this wild well in Vermilion Bay cost the lives of two men and right arm of the fight leader. With a roar that could be heard at Avery Island, 22 miles away, the well belches out over 250,000,000 cubic feet of gas per day.**

Like the "gun that wasn't loaded," a drilling well sometimes "goes off." In spite of experienced engineers, trained crews, modern equipment, and the taking of every conceivable precaution, old Mother Nature sometimes rebels at the persistent gnawing at her vitals,—and when the old lady decides to kick over the traces it takes a lot of fancy harness to get her under control.

On June 3, 1938, a drilling crew was engaged in drilling out the cement plug after setting a string of casing at 9667 feet in a test in Vermilion Bay about three miles away from the nearest shore. After drilling about six inches of new hole below the casing, the driller started pulling the drill stem out of the hole. About 3000 feet of the pipe was pulled out when things began to happen. Gas started out and its volume increased so rapidly that the crew were unable to get the blowout preventers closed before the sand pouring out with the gas had cut them to the point of uselessness. In a short time the well was completely out of control. The blast of gas and sand cut off the well head connections, and the vibration started disintegration of the derrick.

Steel girths, bolts, nuts, filled the air. The roar of the gas prevented the possibility of giving orders by word of mouth, and the drilling crew talked back and forth with hand signals. Falling steel became too dangerous and the crew moved out until the drilling barge, derrick and all, could be floated and moved from over the well.

This was a job for specialists and special equipment. The H. L. Patton wild well fighting outfit was summoned from Houston, Texas. Fortunately the sand stopped coming and only a huge column of gas and some fluid roared into the air,—roared so loud that it could easily be heard at Avery Island, 22 miles away. With the cutting action of the sand eliminated the gas did little damage until Patton's crew arrived. Ideas for special equipment were worked out, hurry-up orders sent to the shops, and in a few days the "capping" attempt was under way.

A huge manifold with heavy valves over a Patton "Stinger," suspended on the boom of the famous Patton fire fighting truck, was moved inch by inch over the roaring well. Inch by inch the "Stinger" was lowered in, the gas blowing through the open valves of the manifold. Once they had it in place, and in imminent

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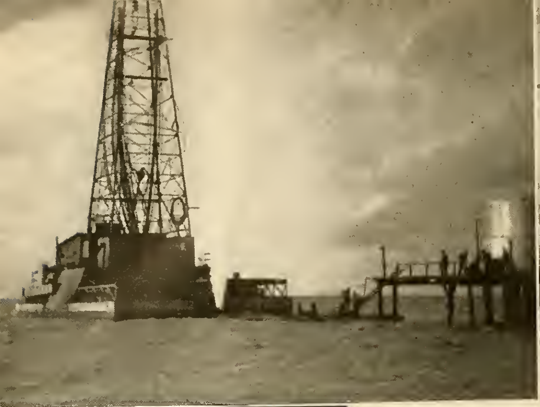
* Engineer, Department of Conservation.

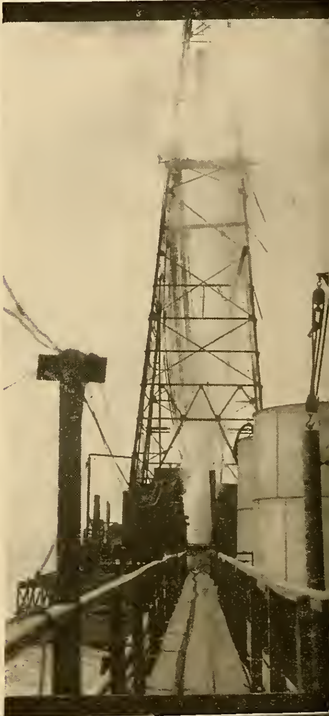


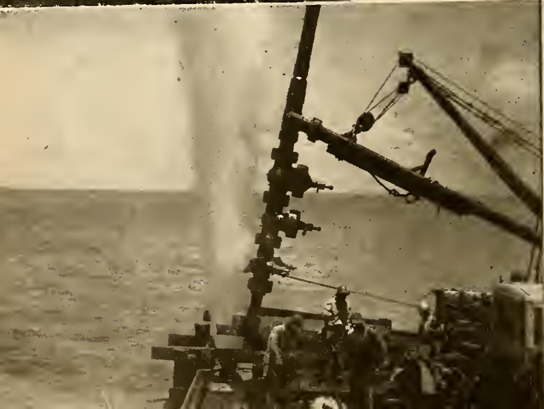
Top left—Derrick barge being moved away from well. Top right—Patton crew checking manifold assembly before moving over well.

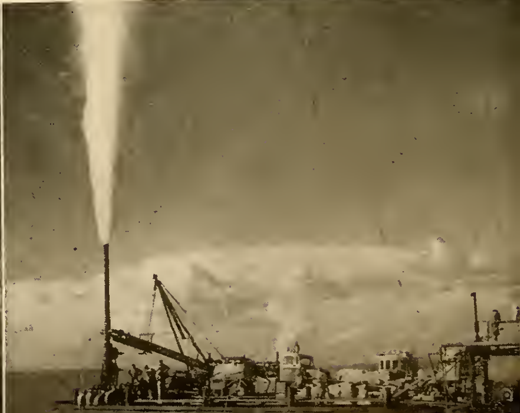
Center left—Close-up of well before removal of derrick. Center right—The derrick starts breaking up.

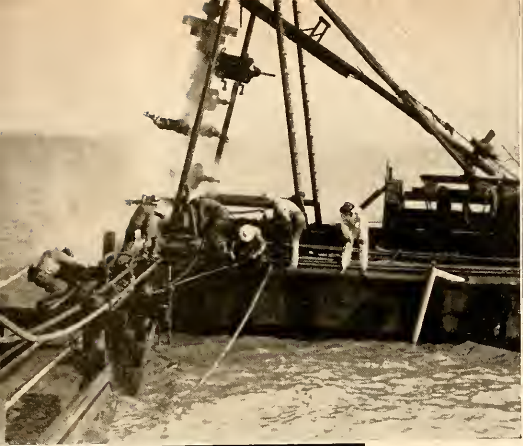
Bottom left—Raising manifold preparatory to lowering it into well. H. L. Patton, in center rear, lost his right arm early on the following morning.

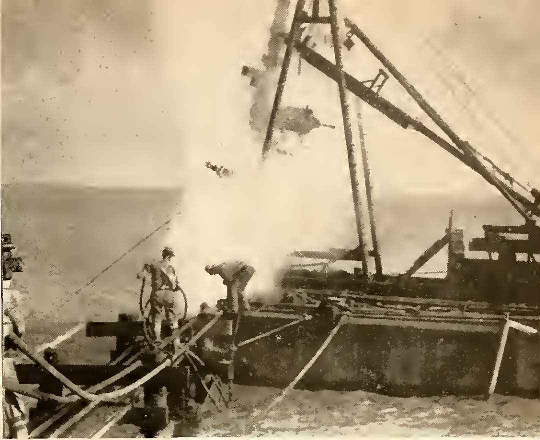
Bottom right—The manifold in place with gas roaring through the stack.

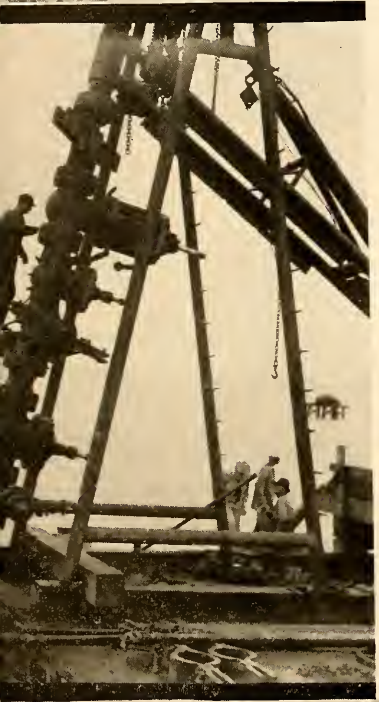








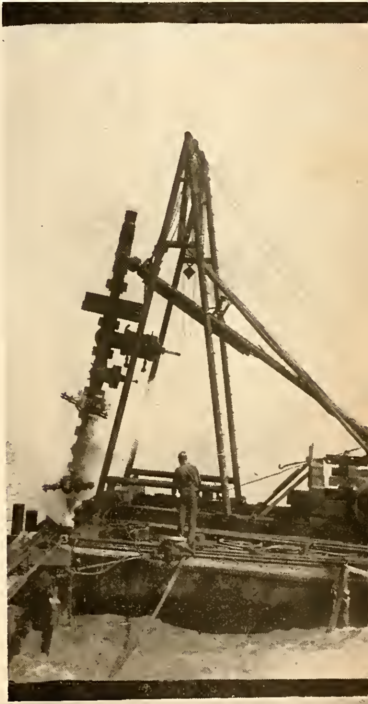




Top left—With repaired and strengthened equipment young Patton carries on for his father and uncle. Moving the second manifold into place over the well. Crew snubbing barge into position. Angled pipe in right foreground to be used to fill barge with water and sink it on bottom of bay. Top right—Lowering manifold into well. Men working in cloud of highly inflammable gas.

Center left—Note worker checking manifold before moving to well. This picture gives some idea of the equipment used. The manifold weighed over 24,000 pounds. Center right—Lowering manifold into well, a critical point in the operation.

Lower left—Adjusting "A" frame. Note gas already roaring through manifold. Lower right—Lowering manifold into position. Gas hides it from view.



■ Disaster. . . . Like a funeral cortege, the wrecked Patton equipment is towed back to Avery Island to be rebuilt, its owner in the hospital with his right arm blown off, his brother dead, and the body of one of his employes lying somewhere in the waters of the bay.

danger of horrible death, the Patton crew with the assistance of the drilling crew rigged heavy chains to fasten the manifold to the well casing. The chains were gradually tightened by turnbuckles until the gas was diverted almost entirely through the manifold. Then slowly against the tremendous pressure, the almost exhausted group started closing the valves. First one valve, then the other yielded a little until both were closed.

Darkness of night added further difficulty to the task, but the crews kept at it. Halliburton pumps were brought into play and succeeded in getting some water into the well, but apparently could not build up enough pressure to kill it. Small leaks around the bottom of the manifold began to develop, — became large enough to convince the workers that this attempt had failed. Exhausted and discouraged, they decided to cut loose from the well, let the gas cut the heavy manifold from the well head and drop it into the bay. With this in mind the Patton crew started to flange on the stack used to prevent the gas from cutting the valves. Then hell broke loose. With a blast like that of a huge cannon, the well burst the chains holding down the manifold, and roared free into the air,—on fire.

Edward Richardson was on the manifold as it broke loose. Bill Patton was standing by handing him a wrench. Patton was knocked to the ground dead. Richardson's burned body was found by a lugger, several days later, over a mile from the well. H. L. Patton, in charge of the operation, was carried by airplane to a hospital in New Iberia, his right arm blown off near the shoulder. The well, bursting into flame when it exploded, was loose again. The slug of water already pumped in was thrown out, extinguishing the fire a few seconds after the blast.

A job like this, however, can't be dropped. Regardless of temporary failure, regardless of exhaustion and discouragement, the job goes on. A few days later, and with more equipment, the Patton crew started again. This time they were successful. The well was finally capped, mud was pumped in, the well killed,—and all is again quiet on the Vermilion Bay Front.

Agents of the Department of Conservation who witnessed the work were loud in their praise of these unsung heroes of the oil fields. Mingled with a feeling of regret for those who gave up their lives just doing their jobs, is a strong feeling of admiration for the coolness, the courage, and the endurance, not only of Patton's crew, heroes of hundreds of successful oil field battles, but also for the drilling crews on every well who face the possibility of similar danger day after day,—just doing their jobs.

◆

The Lafitte Reserve

Current estimates of The Texas Company's Lafitte oil field reserve is 100,000,000 barrels, of which 9,829,516 barrels had been produced through June, 1938, the daily production being 16,156 barrels on July 1, 1938.

This compares with the estimated reserve of The Texas Company's Caillou Island field of 45,000,000 barrels, of which 19,334,005 barrels had been produced through June, 1938, the daily production being 16,949 barrels on July 1, 1938.

◆

Deepest Well

Deepest producing oil well in the world is Fohs Oil Company's Buckley Bourg No. 1, located in West Dulac, Terrebonne Parish. The well was drilled to a total depth of 13,333 feet and is producing from Miocene sands at between 13,254 and 13,266 feet.

◆

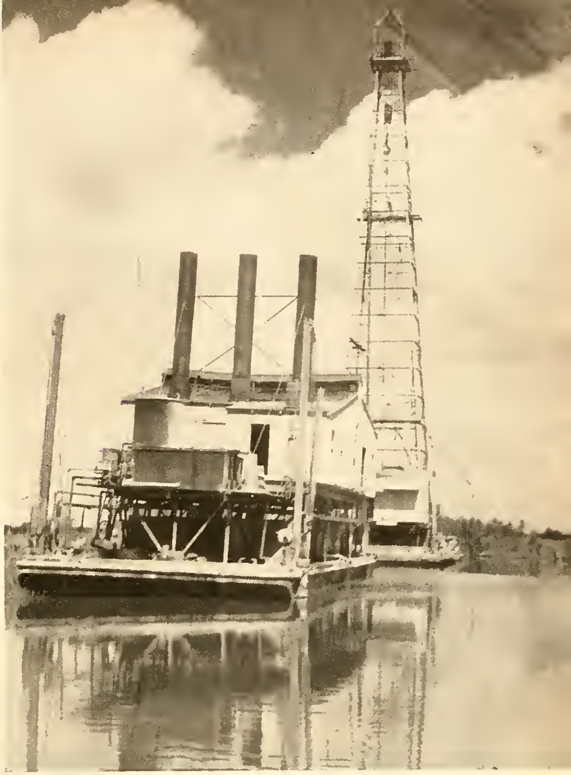
Forestry Work

Under Section II of the Clark- McNary law Louisiana receives an appropriation of $51,000 a year to help in protecting forests from fire. Under Section IV of the same act there is an appropriation of $1,600 received by the State towards the maintenance of a tree nursery, thereby permitting the sale of tree seedlings at cost to farmers and others for the purpose of rehabilitating cut-over and abandoned farm lands.

The Department of Conservation has a tree nursery at Woodworth, La., where pine seedlings may be purchased at $1.50 per thousand, hardwood seedlings at $2 to $2.50 per thousand, packed and ready for shipment, f. o. b. Woodworth.

Frontier of Louisiana Oil Production

Farthermost South and East of Gulf Coast Fields



■ **Texas Co. drilling barge, Garden Island Bay field. This was the pioneer drilling barge of the Company.**

At the mouth of the Mississippi River, where the "trembling prairie" meets the open waters of the Gulf, is one of the most interesting of the South Louisiana oil fields. It is interesting for reasons that are both historical and contemporaneous—here Nature and man have given us a picturesque cross-section of their handiwork.

The Garden Island Bay salt dome is believed to be the largest of the coastal region—at any rate, it is the largest that has been plotted to date. And the sedimentary deposits of the River here are comparatively recent, as geological time goes, so that the formations overlying the dome and its flanks have not yet settled into a solid foundation.

The Pass á Loutre crevasse finally buried the site of the old Spanish Magazine, a settlement at the mouth of the Mississippi River in 1734. Prior to this crevasse Garden Island Bay was a bay with an average depth of six feet. To-day the Garden Island Bay area consists of marshes and bayous. The marsh has advanced across the site of the old Spanish settlement and submergence has hidden it from many modern treasure-hunters who followed fabulous tales as to the stores of gold which it contains.

It is this condition that makes the drilling of a hole in the Garden Island Bay area an exciting experience, as the field foreman, Frank Peavey, testifies. Drillers in other areas may have a fairly accurate picture of what they will encounter on the way down, but at Garden Island it is always an adventure, the shifting and shaking of the submerged strata deflecting the course of the drill stem in a most disconcerting manner.

The Garden Island field is a part of the area originally set aside by the State of Louisiana as a wildlife sanctuary, the Pass á Loutre Refuge, which embraces in all about 66,000 acres. At that time no one dreampt that to-day it would be producing nearly 3,000 barrels of crude oil every twenty-four hours, a yearly income of over a million dollars, from which the State receives its one-eighth royalty. In fact, the State receives a royalty from most of the producing wells of southeast Louisiana, as this production is coming from state-owned water bottoms under lease to the operators.

The Garden Island Bay dome was discovered by refraction seismograph in 1928. At first it was extremely difficult to obtain any accurate recording, owing to the character of the underlying formations, the deflection being as much as five miles from the actual structure, but science finally triumphed, so that now we have a very good picture of the dome.

Physiography of the Garden Island Area

The Garden Island field is a section of the submerged area of lakes, bays and sounds along the Louisiana coast. It is apparent that the Mississippi River delta is centrally located in the part of the coast showing the most striking evidence of submergence. That this happens to coincide with an area receiving a daily load of at least two million tons of sediment can hardly be regarded as a matter of chance—rather, it is a cause and effect relationship.

Dr. R. J. Russell, of the Louisiana State University, tells us that the weight of the sedimentary deposit of successive deltas is such that it causes a downwarping of the earth's crust locally, and, in all probability, an elevation of land farther inland. Swinging of the River mouth back and forth concentrates the sedi-

■ **Latching on to swivel well 28 D drilling barge, The Texas Company, Garden Island Bay field.**

ments in a belt parallel to the coast, where they attain an enormous thickness in the course of time. Structurally, this means the creation of a downward furrow or geosyncline.

Delta-Flank Depression

The delta-flank depression of the Mississippi River includes part of the Mississippi Sound, Lakes Borgne, Pontchartrain and Maurepas, and the low marshy and swampy lands that surround them. The western depression includes many bays and lakes in the three parishes west of Plaquemines, the conspicuous bays from Atchafalaya to Vermilion, and lakes beyond in the chain extending into Cameron Parish. Marshes and swamps extend well inland through the Atchafalaya Basin.

It is undoubtedly significant that the whole American coast of the Gulf of Mexico nowhere else exhibits so many swamps, nor as many bays and other irregularities, as along the immediate flanks of the Mississippi River.

The basal portion of the Gulf Coast Geosyncline has now reached a depth somewhere in the neighborhood of three times that of the deepest waters of the Gulf of Mexico. Its landward element has risen so that strata in the Coastal Plain have been truncated by erosion. Bed-rock dips exceed surface slopes, and both incline toward the Gulf. Outcrop patterns are not perfectly straight and parallel to the shore line, though on a regional scale they approach that condition. They bend inland around several subsidiary basins of deposition, as in southern Texas, and along the Mississippi embayment.

■ **Frank Peavey, field foreman, The Texas Co., Garden Island Bay field.**

Though many streams have contributed sediment to the Gulf Coast Geosyncline, the dominant factor today is the Mississippi River, and it seems probable that the same stream, or its earlier equivalents, have so functioned in the past. The Louisiana coast appears to have been the center of the most active deposition throughout at least the latter half of the history of the geosyncline.

While there appears to be considerable evidence that the axis of the Gulf Coast geosyncline has shifted southward, probably rather gradually, since late Mesozoic time, the general story suggests striking stability of the shore line.

The boundary between continental and marine deposition, ever swinging back and forth and gradually advancing southward on the whole, has approximated the present position of the coast during most of the latter part of the Cenozoic time. Within comparatively recent times there are distinct records of vertical oscillations.

Delta physiography is in many respects similar to floodplain physiography. Natural levees are dominant forms. They are the highest land, and from their crests gentle slopes lead to marshes, swamps or open water.

The trough of North America's most active geosyncline parallels the Gulf coast and has been filled to an extent of some 30,000 to 40,000 feet during Cenozoic time. This is the area in which we find the Garden Island dome.

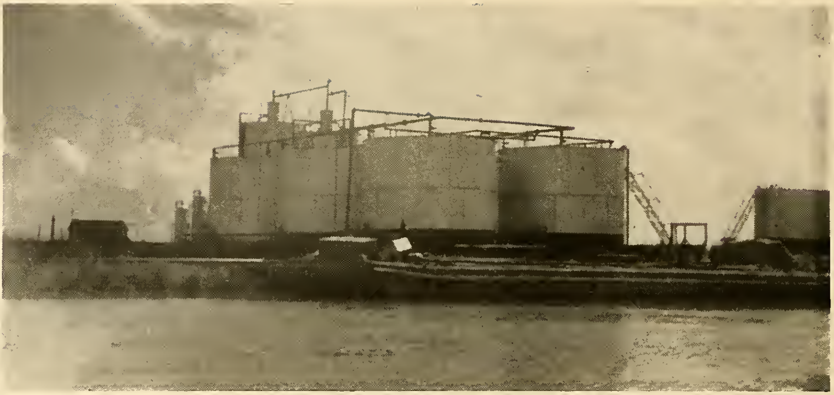
Most oil wells penetrate the geologic column where thinnest and in the Gulf Coast region they are generally attempts to find uparched strata associated with salt domes. Wells not encountering a section uparched above regional levels are ordinarily abandoned promptly.

Questions such as the depth of alluvium, or even the top of the Pliocene, are not usually answered by oil well evidence. Coring, necessary for the accurate identification of geological horizons, is ordinarily not started until wells have reached a considerable depth. In many ways the section is better known below the Pliocene than above it.

Persistence Finally Brings Its Reward

The experience of The Texas Company in the Garden Island Bay field shows the faith and persistence of operators in following the advice of

■ **Office and quarters, The Texas Company, Garden Island Bay field.**



■ **Stock tanks and barge loading docks, The Texas Company, Garden Island Bay field.**

their geologists and geophysists, once an oil structure is indicated. Fifteen dry holes were drilled by the Company before commercial production was obtained.

The first well drilled on the dome encountered salt at 2,014 feet. After testing an oil show at 1,685 feet this well was abandoned on June 10, 1929. The Company's No. 2 well had a gas blow-out at 790-795 feet. No. 3, completed in 1930, encountered gas between 918 and 1,016 feet, oil sands between 1,685 and 1,688 feet and salt at 2,018 feet. No. 4, drilled off the eastern flank of the dome, was completed in 1931 at a depth of 5,621 feet without oil or gas shows of importance.

Two gas blow-outs occurred during 1932, when Garden Island Bay Nos. 5 and 6, located approximately 330 feet apart on the northwestern portion of the plug, encountered sands at 801 and 816 feet.

In the three wells completed by the Company in 1933 No. 7 topped cap rock at 1,796 feet and salt at 2,115 feet; No. 8 penetrated cap rock for 169 feet before striking salt at 2,265 feet; No. 9 drilled into cap rock at 1,794 feet and salt at 2,098 feet. The No. 10 well was abandoned in 1934 in gypsum at 1,831 feet after having several shows of oil and sulphur from 1,671-1,789 feet.

Garden Island Bay No. 11 had an initial production of 60,000,000 cubic feet of gas with a pressure of 675 pounds from sand at 1,517 feet. The well was side-tracked four times from depths of 684, 982, 1,669 and 1,816 feet before completion as a gas well on August 3, 1934. No. 12, 1,000 feet east of No. 11, had several shows of oil before abandonment in broken lime at 1,753 feet. No. 14 and No. 15, on the northern flank of the dome, were two dry holes completed early in 1935.

The first commercial oil production in this field was obtained on Sept. 13, 1935, seven years after discovery of the field, when The Texas Company's No. 16 was completed for an initial daily production of 1,750 barrels of 37.2 Baume oil from a sand at 4,922 feet.

■ **The Texas Company gun barrel and stock tanks, Garden Island Bay field.**

■ **Texas Company well showing hurricane choke lubricator and reel, Garden Island Bay field.**

■ Garden Island Bay well which blew out at depth of 816 feet. Sediments overlying the gas sand or "gas pocket" gradually sealed off the flowing gas. The blow-out made a total wreck of the derrick and drilling equipment, part of the derrick being lost in the hole.

In 1936 the Garden Island Bay field produced 310,884 barrels of oil and in 1937 it produced 606,212 barrels of oil and 150,110,000 cubic feet of gas. There are now ten producing wells located on flanks of the dome.

* * *

Petroleum Is Derived From Plant Life?

A Harvard university scientist recently disclosed that he had found a new clue to a long standing hypothesis that the world's underground stores of petroleum derive from plant life.

It all began when Biology Instructor William C. Darrah ran across a fossilized first cousin of the present-day common ground pine of New England while he was collecting biological specimens near Mazon creek in Grundy county, Illinois.

There, enclosed in carboniferous rock, he said, he discovered "the most perfect plant fossil ever found"—a club moss cone over 200,000,000 years old, and in "unbelievable" preservation.

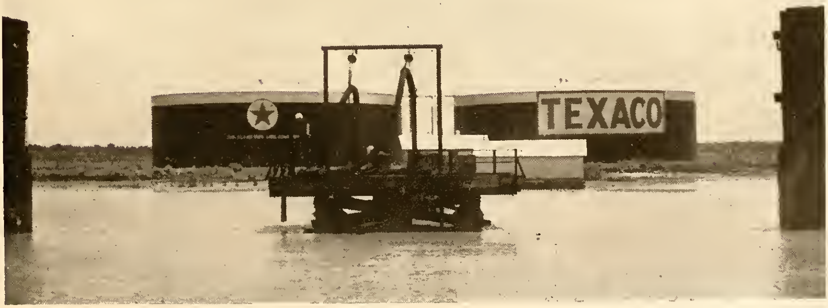
Original oils of the plant, Darrah explained, were preserved in a hardened state through hydrogenation, a process by which oxygen and water are lost and hydrogen is acquired. And these, said he, formed a transparent casing for the plant's delicate protoplastic structures in a "mummified" state, even as wrappings preserved the ancient kings. In ordinary plant fossils, preservation of details is very crude at best.

It will be on these fossilized oils, the biologist said, that scientists will now train their microscopes to test whether plant oils are an important source of natural petroleum, as many geologists have long believed.

* * *

Louisiana has the largest number of amphibious creatures of any state in the Union. The alligator is found in greatest abundance in the fresh water regions near Gulf level. It is of commercial importance for its hide. Sea turtles, diamond back terrapin, snapping turtles, fresh water loggerhead and fresh-water terrapin are sold.

Louisiana leads in the production of frogs; the giant bullfrog and the lake bullfrog which are found in the fresh water swamp regions near Gulf level. Reptiles such as salamanders, tree frogs, toads and lizzards are common, and non-poisonous. There are about 40 species of snakes in this State, and but few snakes are poisonous. Snakes are beneficial in destroying mice and rats.



■ Texas Pipe Line Co. storage tanks, pump house, boat house and tanker loading terminal on Mississippi River at Pilot town.

A Survey of the Louisiana Fresh Oyster Industry

By

GEO. H. SEFEROVICH*

The 1938 oyster season is now under way. This is, therefore, an opportune time to take stock of Louisiana's fresh oyster industry. If the new season should equal the last season about 3,250,000 bushels will be produced, some 5,000 people will be engaged in various phases of the industry, and the crop will be worth about $2,250,000. There are many interesting facts connected with Louisiana's oyster industry and many perplexing problems. This series of articles will attempt to discuss briefly some of the more important facts and to indicate some of the serious problems arising in marketing the crop. The discussions will be divided into three parts, (1) the supply aspects, (2) the demand aspects, and (3) Louisiana's ability to compete with the other oyster producing areas of the United States.

I

The Supply Aspects

Oysters thrive in the shoal waters along the Louisiana coast where fresh and sea waters mix to attain a salinity of between 20% and 50% seawater. In addition to salinity, both the food content and the temperature of the water are vital elements. Louisiana's coastal waters are supplied with an abundance of food for oysters by the great Mississippi drainage basin. In addition to the abundant food content of the waters, the relatively mild climate permits a lengthy spawning season. All of these elements combine to place few restrictions on the natural fecundity of oysters. We shall see later, however, how the advantages of some of the vital elements mentioned are offset by certain disadvantages. For example, the mild climate permits a lengthy spawning season. The relatively high salinity produces an oyster of superior flavor, but it is also conducive to the destructive activities of certain natural enemies, e. g., the conch. In addition, the lengthy spawning season and the relatively high salinity in some locations might be a reason for the small supply of fat oysters prior to December.

In order to obtain a better understanding of the supply aspects of the Louisiana fresh oyster industry, it might be well to mention briefly some of the stages in the life history of oysters. The Louisiana oyster, unlike some of the other species, is a protandrous hermaphrodite, i.e., it is first a male and at the end of its first season it may change to a female under certain conditions. (cf. M. D. Burkenroad's article: "A Study of Sex In The Louisiana Oyster", **The Louisiana Oyster**, Bulletin No. 1 (revised), Department of Conservation, State of Louisiana, 1931.) When the waters in which the oysters live attain a temperature of approximately 76°F., and a specific gravity of 1.014 optimum spawning conditions exist. The ovum and sperm generated by the female and male respectively are extruded into the water. Millions of these microscopic cells are cast into the water by one oyster. The life cycle of an oyster begins when an egg is fertilized by a sperm. The penetrated egg begins to evolve immediately and commences a free swimming stage which lasts about 14 or 16 days. At the end of the free swimming stage the oyster has developed a minute pair of valves or shells and drops to the bottom to seek a resting place. If it finds a hard, clean surface it will cement its left valve or shell to it and remain until destroyed by natural enemies or until removed by man.

Under natural conditions the new generation of oysters will seek its resting place on the older generation. Thus immense reefs are built. Until rather recently oysters were always scraped or dredged off these natural reefs in order to supply the demand for them. When this is the dominant mode of supplying the demand, the industry is said to be extractive, i.e., similar to operating a coal mine or a gravel pit; no effort is made to restore or help nature restore the supply. Because of this destructive method the once prolific beds of New England are now practically depleted.

There is another method of supplying the demand. Ostreaculture or the cultivation of oysters is very ancient. It is usually attributed to a Roman aristocrat, Sergius Orata, who made a fortune cultivating oysters in his **Ostrearium Vivaria** at Baiae about 94 B.C. By this method suitable water bottoms are selected and prepared, spawning oysters are placed on the bottoms, and the young oysters or "spat" settle on the prepared bottom. The young oysters form an oyster crop, which can be worked, cultivated, and reaped to supply the demand. Thus the ostreaculturist is much like a farmer, he is an aquaculturist. If the ostreaculturist does not sow the prepared bottom with spawners, he may re-bed seed oysters, taken from the natural reefs, which will mature in from 1 to 5 years depending upon the temperature of the water and the age of the seed. When the demand is supplied by cultivated oysters, the industry is said to be genetic, **i.e.**; man labors along with nature.

Louisiana's oyster industry has passed from the extractive stage to the genetic type of industry in the history of its development. The importance of Louisiana in the nation's fresh oyster industry has grown considerably since the first comprehensive report on the industry of the United States was made by Ernest Ingersoll for the Tenth Census in 1880. Mr. Ingersoll placed Louisiana seventh with a production of 295,000 bushels valued at $200,000. In 1890, it had moved to fifth place, in 1908 it ranked fourth, and since 1929 it has been the leading producer with the exception of 1931, when it fell to

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* This is the first of a series of selected articles on the Louisiana oyster industry by Mr. Seferovich, whose M.B.A. thesis at L. S. U. College of Commerce furnished the material sources.

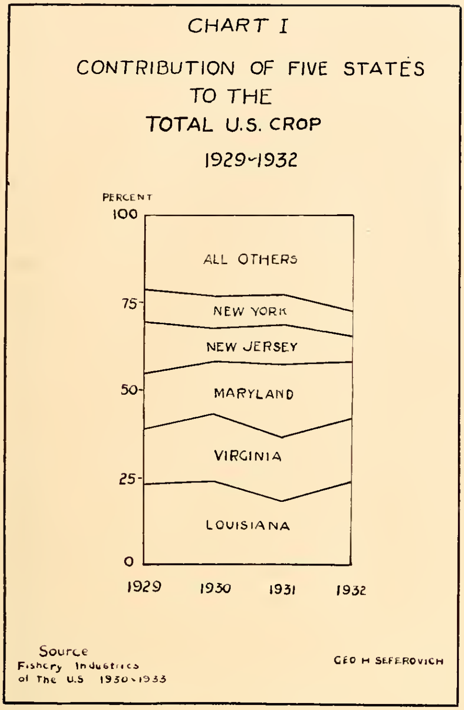


CHART I

CONTRIBUTION OF FIVE STATES TO THE TOTAL U.S. CROP 1929-1932

Source
Fishery Industries of The U.S 1930-1933

GEO H SEFEROVICH

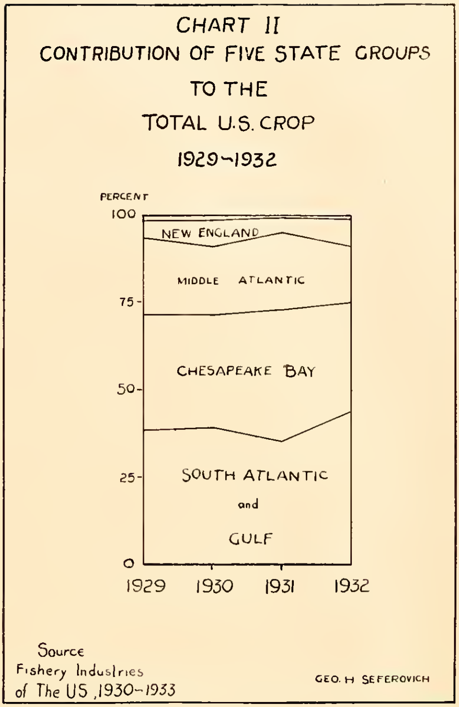


CHART II

CONTRIBUTION OF FIVE STATE GROUPS TO THE TOTAL U.S. CROP 1929-1932

Source
Fishery Industries of The US, 1930-1933

GEO. H SEFEROVICH

third place. In recent years Louisiana has produced between two and four million bushels of market oysters. (cf. Tables I and II and Charts I and II).

In order to understand better the remarkable growth of Louisiana in the nation's industry, it might be well to state briefly a few of the significant points in the history of its development. There seems to be three significant epochs in the development of the industry, (1) earliest times to 1896, (2) 1896 to 1908, (3) 1908 to the present time.

During the seventies and eighties Louisiana was not a large producer, oysters being fished merely to supply the local market. There were no important planting interests, and it was not until the late eighties that the potentialities of the industry were realized. Until 1902 the administration of the oyster bottoms was under the jurisdiction of the police juries of each parish. In 1896, the legislature requested the United States Fish Commission to investigate the industry. As a result, a comprehensive oyster law was enacted in 1902. Another investigation conducted by the United States Bureau of Fisheries in 1908 resulted in laws more conducive to scientific culture. The industry changed from the extractive type to the genetic type in 1908, because of the new laws and the administration of the oyster commission. The oyster laws have been amended from time to time; at the present Act 67 of 1932 governs this natural resource industry. Its essential features are to permit state owned bottoms to be leased at $1.00 an acre for a fifteen-year period renewable for ten years. In addition, the act prescribes the method of dredging, sets the dates of the dredging season, and provides for the issuance of licenses and the collection of privilege and severance taxes.

The investigations which led to the passage of the oyster laws revealed that the waters of the state were subject to incessant change, and that the ideal producing areas changed with the environment. No important plantings have ever been found east of the delta. This area, however, has always been productive of natural reef oysters, used both for seed and canning stock. The plantings are west of the delta in the parishes of Plaquemines, Jefferson, LaFourche, and Terrebonne; here the highly cultivated, delicately flavored oysters used in the half-shell trade are produced.

It was discovered by the investigators that under ideal conditions an acre was capable of yielding from 1,000 to 1,500 bushels of fat oysters, which in turn would yield about 5.5 pints of drained meats to the bushel. These oysters could be sold for $2.00 a barrel or $1.00 a sack on the New Orleans market. Were these ideal conditions true today, there would be few serious problems connected with the industry.

At the present time the productive and marketing methods employed, the organization of the fishery, and prices are essentially unchanged from 1908. The environment, the yield per acre, the meat yield per bushel, and the purchasing power of prices received have changed considerably. Today the state is the largest producer of cultivated oysters in the United States. Of all the market oysters produced in Louisiana, 76.7% are produced on private beds, i.e., ostreaculture is employed in some degree, and hence the industry is predominantly of the genetic type. The production on private beds is for the greater part from re-bedded seed. From Barataria Bay westward there exists some true ostreaculture, i.e., planting cultch or shells and catching the spat thereon. But, from Barataria eastward the industry is one of re-bedding seed. East of the delta only reefs exist which supply the seed oysters for re-bedding and "coons" for the Mississippi canneries. About 70% of Louisiana's total production goes to the canning trade, but the remaining 30% is marketed for raw and cooked consumption.

The following parishes in Louisiana lead in oyster production, viz., Iberia, Jefferson, LaFourche, Orleans, Plaquemines, St. Bernard, St. Mary, Terrebonne, and Vermilion. There are about 4,000 fishermen engaged in the industry, 50% of whom are native Mississippians who dredge the reefs in St. Bernard Parish for the oysters to be used in Mississippi's canneries.

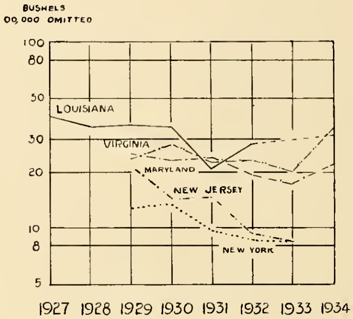
Louisiana possesses about 600,000 acres of water bottoms suitable for oyster culture, 60,000 of which are natural reefs. Although this tremendous area is available for lease only 13,363 acres were under lease in 1935, this was a decrease of 21.4% from 1912 when the cleared acreage under lease was at a maximum. The average acreage under lease from 1928 to 1935 has been higher, however, amounting to 18,094 acres.

Market oysters coming from Louisiana waters are products of much time, labor, and capital. They are destined by their environment and cultural methods for raw consumption. If the oysters are cultivated from the spat stage, three years are required for development to market size. If they are cultivated from seed taken from the natural reefs, about eighteen months are required before they are ready for market, depending upon the age of the seed.

Although the experiments carried on by the Bureau of Fisheries indicated that from 1,000 to 1,500 bushels could be grown on an acre, and a record of the yield on eight selected acres in Plaquemines Parish for the 1927-1928 season showed that 2,812.5 bushels were grown, the yield for the average acreage under lease from 1928 to 1935 was only 121.5 bushels or 522.4 pounds of meat. Therefore, the actual performance has been only about 6.3% of potential. The total cost of pro-

CHART III

RATE OF GROWTH OF OYSTER PRODUCTION
IN THE
FIVE MOST IMPORTANT STATES
1927–1934



Source
Fishery Industries
of The U.S. 1928–1935

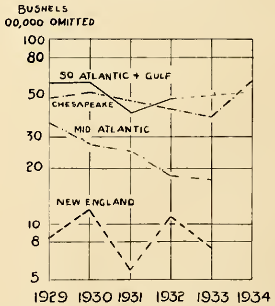
GEO H SEFEROVICH

CHART IV

RATE OF GROWTH OF OYSTER PRODUCTION

BY STATE GROUPS

1929–1934



Source
Fishery Industries
of The U S, 1930–1935

GEO.H SEFEROVICH

Table I

FIVE STATES WHICH PRODUCE BETWEEN 73 AND 78 PERCENT OF THE TOTAL U. S. CROP

(By Rank)

1929				1930				1931				1932			
Group	State	% U. S. Total	% Group Total	Group	State	% U. S. Total	% Group Total	Group	State	% U. S. Total	% Group Total	Group	State	% U. S. Total	% Group Total
Gulf	La.	23.06	59.86	Gulf	La.	23.59	60.70	Ches. Bay	Md.	19.90	50.68	Gulf	La.	23.50	58.07
Ches. Bay	Md.	16.56	51.48	Ches. Bay	Va.	19.08	55.34	Ches. Bay	Va.	19.36	49.32	Ches. Bay	Va.	18.93	54.22
Ches. Bay	Va.	15.65	48.52	Ches. Bay	Md.	15.40	44.66	Gulf	La.	18.19	52.50	Ches. Bay	Md.	15.99	45.78
Mid. At.	N.J.	14.49	62.54	Mid. At.	N.J.	9.37	50.46	Mid. At.	N.J.	12.39	58.70	Mid. At.	N.J.	7.82	50.53
Mid. At.	N.Y.	8.58	37.03	Mid. At.	N.Y.	8.83	47.49	Mid. At.	N.Y.	8.11	38.43	Mid. At.	N.Y.	7.07	45.70
Total % US Total		78.34				76.27				77.95				73.31	

Source: Compiled by G. Seferovich from data appearing in the annual administrative reports of the U. S. Bureau of Fisheries.

Table II

OYSTER PRODUCTION IN LOUISIANA 1880-1937

Year	Bushels	Year	Bushels
1880	295,000	1923	1,022,143
1887	678,227	1927	2,419,071
1888	719,992	1928	1,955,571
1889	835,520	1929*	2,401,004
1890	841,585	1930*	2,304,718
1897	959,190	1931*	1,222,966
1902	1,198,413	1932*	2,146,159
1904	1,620,576	1933	1,850,448
1905	2,187,000	1934*	3,425,772
1908	3,623,800	1935	2,113,218
1911	4,504,402	1936	2,303,097
1918	1,828,606	1937	3,261,528

SOURCE: Compiled by G. Seferovich from various annual reports of the United States Fish Commission and the United States Bureau of Fisheries.

NOTE: *Adjusted for oysters fished in Louisiana waters by Mississippi fishermen, records for other years not available.

duction on the eight selected acres mentioned was 26c a bushel or 39c a sack.

Because of the environment and methods employed in the industry, Louisiana's oysters are large and well-shaped, and they possess a delicate, cultivated flavor which fits them for raw consumption.

Mink Pelts

Louisiana annually produces more mink pelts than any other state of the Union. With the exception of the otter the mink is the most valuable pelt taken in this State.

Leading mink producing parishes are Terrebonne, St. Mary, Lafourche, Cameron, Vermilion, Assumption, Plaquemines and Calcasieu. In fact, the mink is taken in every parish of the State.

Tree Seedlings Soon Available For South

Effective November 15, 1938, the Louisiana Department of Conservation through its Division of Forestry will start shipping seedlings to small and large landowners not only in Louisiana but throughout the South. The following list of three seedlings will be available:

Species		*Quantity*
Loblolly Pine	(*Pinus Taeda*)	**3,000,000**
Longleaf Pine	(*Pinus palustris*)	**230,000**
Shortleaf Pine	(*Piaus echinata*)	**370,000**
Slash Pine	(*Pinus caribaea*)	**5,000,000**
Black Locust	(*Robinia pseudoacacia*)	**530,000**
White Ash	(*Fraxinus americana*)	**50,000**
Sycamore	(*Platanus occidentalis*)	**10,000**
Red River Oak	(*Quercus nutullii*)	**2,000**
Water Oak	(*Quercus nigra*)	**3,000**
Live Oak	(*Quercus virginiana*)	**10,000**
Cypress	(*Taxodium distichum*)	**20,000**
Red Bud	(*Ceris canadensis*)	**10,000**

The price on pine seedlings will be $1.50 per thousand, ready for shipment, F. O. B. Woodworth, Louisiana. The black locust seedlings will be $2.00 per thousand; and the hardwood seedlings will be $2.50 per thousand.

All orders for seedlings must be sent to the Louisiana Department of Conservation, Division of Forestry, New Orleans, Louisiana.

In 1937 a great many landowners were disappointed through waiting until the last minute to place orders, and it is requested that orders be sent in as early as possible this year as all shipments are made in accordance with the order in which they are received.

It is necessary for landowners residing outside of the State of Louisiana to place their requests for seedlings through their respective State Foresters.

Field	Name of Company	Name of Well	Date Completed	Initial Daily Production	Size Choke (Inch)	Grav- ity	Total Depth (Feet)
SORRENTO (Ascension Ph.)	Pan American Prod. Co.	United Lands Co. #9	4/1/38	129 Bbls.	1/4	23	1,334
	Pan American Prod. Co.	United Lands Co. #10	5/15/38	209 Bbls.	1/4	25	901
SOUTH CROWLEY (Acadia Ph.)	Humble Oil & Refg. Co.	L. B. Finch #1	4/29/38	518 Bbls.	1/4	36	....
STARKS (Calcasieu Ph.)	J. R. Turnbull	Industrial Lbr. Co. #3	4/2/38	140 Bbls.	....	....	....
SULPHUR MINE (Calcasieu Ph.)	Union Sulphur Co.	Fee #860	5/29/38	350 Bbls.	21/64	29	5,130
	Union Sulphur Co.	Fee #861	6/3/38	100 Bbls.	....	20	3,564
	Union Sulphur Co.	Fee #863	6/26/38	410 Bbls.	5/16	24	3,484
SWEETLAKE (Cameron Ph.)	Pure Oil Co.	Yount Lee Oil Co. #7	6/13/38	422 Bbls.	14/64	30	6,410
VENICE (Plaquemines Ph.)	Tidewater Assoc. Oil Co.	Manhattan Land & Fur Co. #7	5/21/38	561 Bbls.	3/16	43	7,154
VILLE PLATTE (Evangeline Ph.)	Continental Oil Co.	Opelousas-St. Landry #1	5/4/38	394 Bbls.	3/16	40	9,110
	Continental Oil Co.	Martha Haas #1	5/26/38	509 Bbls.	3/16	38	9,098
	Continental Oil Co.	Hattie Haas #1	5/31/38	790 Bbls.	3/16	39	9,156
	Amerada Petroleum Co.	Alex F. Fournier #1	6/22/38	763 Bbls.	1/4	....	....
	Continental Oil Co.	Ludeau-Haas #1	6/8/38	799 Bbls.	3/16	41	9,070
	Continental Oil Co.	Vidrine-Deville #1	6/25/38	664 Bbls.	3/16	39	9,110
WEST HACKBERRY (Cameron Ph.)	W. T. Burton	Kennedy #2	4/21/38	356 Bbls.	1/4	20	3,238
	Stanolind Oil & Gas Co.	State of La. #55	5/1/38	381 Bbls.	1/4	21	3,180
	Superior Oil Co.	Benson Vincent #1	5/10/38	2 MCF	12/64	58	6,913
	Sutton Oil Co.	Mary Duhon #1	5/11/38	391 Bbls.	1/4	20	3,265
	Sutton Oil Co.	Robt. Ellender 2-A	6/7/38	100 Bbls.	5/16	20	3,285
	W. T. Burton	F. Lacey #1	6/28/38	112 Bbls.	3/16	32	3,683

Oil and Gas Wells Completed in North Louisiana During 2nd Quarter of 1938

Field	Name of Company	Name of Well	Date Completed	Initial Daily Production	Size Choke (Inch)	Grav- ity	Total Depth (Feet)
BELLEVUE (Bossier Ph.)	C. H. French	Larkin #2	5/2/38	12 Bbls.	....	18	....
BULL BAYOU (De Soto Ph.)	The Texas Co.	R. E. Thigpen #1	5/14/38	10 MCF	....	....	2,726
CONVERSE (Sabine)	Royal Oil & Gas Co.	Frost Lbr. Co. A-3	5/8/38	36 Bbls.	....	41	1,961
	Lee Whiteburst et al	Frost Lbr. Co. #6	5/15/38	16 Bbls.	....	41	2,068
COTTON VALLEY (Webster Ph.)	Hunt Oil Co.	Webb #3	5/25/38	984 Bbls.	24/64	....	6,060
	Hunt Oil Co.	Babb #6	5/27/38	207 Bbls.	1/4	62	8,505
	Hunt Oil Co.	Babb #7	5/27/38	145 Bbls.	....	52	6,155
	North America Oil Co.	E. W. Stewart #1	4/1/38	845 Bbls.& 10 MCF	1/2	62	8,469
	Ohio Oil Co.	Bodcau Lbr. Co. 3-49	4/28/38	384 Bbls.	3/8	62	8,205
	Union Producing Co.	E. L. Stewart #1	4/29/38	307 Bbls. & 5 MCF	5/16	....	8,328
	Magnolia Pet. Co.	Coyle-Tiner #1	5/3/38	533 Bbls.	1/2	71	8,520
	North American Oil Consolidated	Stewart #2	5/2/38	816 Bbls.	1/2	51	5,838
	The Ohio Oil Co.	Mattie Crutsinger #1	5/9/38	553 Bbls. 6 MCF	....	61	8,487
	The Ohio Oil Co.	Bodcau Lbr. Co. #50	5/27/38	1,193 Bbls.	1/2	51	5,726
	The Ohio Oil Co.	Bodcau Lbr. Co. #3	5/31/38	216 Bbls.	1/4	62	8,280
	Hunt Oil Co.	Davis #9	6/7/38	1,556 Bbls.	1/2	....	5,965
	Hunt Oil Co.	Bodcau & Stewart #1	6/11/38	1,291 Bbls.	1/2	68	6,013
	Magnolia Petroleum Co.	Crichton Heirs #3	6/16/38	566 Bbls.	1/2	70	5,809
	H. I. Morgan	Hope #A-1	6/1/38	360 Bbls.	5/16	62	8,216
	Ohio Oil Co.	A. H. Gray #2-24	6/8/38	512 Bbls. & 6 MCF	3/8	....	8,223
	Ohio Oil Co.	S. B. Sandlin #1	6/12/38	432 Bbls.	3/8	71	8,153
	Ohio Oil Co.	H. G. Gray #1	6/15/38	336 Bbls.	3/8	71	8,359
	Ohio Oil Co.	Sidney Jackson #1	6/20/38	453 Bbls.	3/8	71	8,189
	Ohio Oil Co.	R. L. Holloway #4	6/27/38	24 Bbls.	1/8	....	5,633
	A. G. Oliphant	Sam Banks #3	6/1/38	384 Bbls.	1/4	62	8,390
	A. G. Oliphant	Stewart & Stewart #1	6/4/38	540 Bbls. & 6 MCF	1/2	70	8,532
	Stanolind Oil & Gas Co.	Pardee #1	6/6/38	912 Bbls.	1/4	....	8,635
DIXIE (Caddo Ph.)	W. G. Ray Drlg. Co.	Hunter Co. #5	5/10/38	200 Bbls.	....	41	2,451
LISBON (Claiborne Ph.)	Atlantic Refg. Co.	E. C. English #1	4/5/38	468 Bbls.	16/64	34	5,238
	Gulf Refg. Co.	C. C. Whitman #1	4/17/38	240 Bbls.	10/64	34	5,205
	Hollyfield & McFalrane	H. W. Patton #4	4/19/38	264 Bbls.	8/64	34	5,255
	Oakes, Carathers & Morelock	C. C. Whitman #1	4/14/38	198 Bbls.	14/64	33	5,273
	Vaughn & Marr	J. T. Eppinger #B-1	4/3/38	528 Bbls.	19/64	34	5,132
	Atlantic Refg. Co.	Bean #C-1	5/16/38	1,176 Bbls.	3/4	34	5,222
	Harry Fotiades	T. M. Kilgore & F. B. King #4	5/15/38	495 Bbls.	11/64	34	5,358
	Harry Fotiades	T. M. Kilgore & F. B. King #3	5/15/38	132 Bbls.	11/64	34	5,375
	Gulf Refg. Co.	Maggie Patton #3	5/17/38	1,066 Bbls.	2	34	5,252
	T. L. James & Co.	D. E. Fowler #3	5/4/38	777 Bbls.	32/64	34	5,199
	C. H. Lyons	Sallie Lloyd #A-1	5/8/38	396 Bbls.	28/64	34	5,208
	Love Petroleum Co.	S. M. English #1	5/18/38	792 Bbls.	18/64	34	5,225
	Magnolia Petroleum Co.	Sally Lloyd #1	5/2/38	777 Bbls.	1/2	34	5,260
	Morelock & J. R. Bevill	T. M. Kilgore #1	5/17/38	388 Bbls.	21/64	34	5,346
	W. H. North	C. S. L. Patton #1	5/22/38	408 Bbls.	17/64	....	5,285
	Scout Oil Corp.	J. C. Fowler #1	5/17/38	198 Bbls.	14/64	34	5,256

Field	Name of Company	Name of Well	Date Completed	Initial Daily Production	Size Choke (Inch)	Grav-ity	Total Depth (Feet)
LISBON (Claiborne Ph.) (Continued)	Sells Petroleum Inc.	C. S. L. Patton #1-A	5/12/38	408 Bbls.	14/64	34	5,340
	Sklar Oil Corp.	T. M. Kilgore #1	5/20/38	1,248 Bbls.	3/4	....	5,306
	Sloan & Zook Co.	H. W. Patton #7	5/19/38	356 Bbls.	3/4	34	5,266
	The Texas Co.	Tippett #1	5/6/38	528 Bbls.	22/64	34	5,308
	Texas Canadian Oil Co.	D. E. Fowler #1	5/31/38	429 Bbls.	3/4	34	5,255
	W. A. Tharpe	J. B. Fowler #1	5/14/38	1,248 Bbls.	14/64	34	5,284
	Vaughn-Marr	J. T. Eppinger #B-2	5/2/38	1,608 Bbls.	1	....	5,096
	Weaver Oil Corp.	Patton #1	5/24/38	288 Bbls.	1/2	....	5,293
	Harry Fotiades	T. M. Kilgore #1	6/29/38	576 Bbls.	17/64	34	5,302
	Harry Fotiades	T. M. Kilgore & F. B. King #2	6/6/38	240 Bbls.	15/64	34	5,236
	Harry Fotiades	C. C. Whitman #1	6/6/38	562 Bbls.	20/64	34	5,240
	M. J. Grogan	C. C. Whitman #1	6/16/38	132 Bbls.	17/64	34	5,199
	Gulf Refg. Co.	Maggie Patton #4	6/14/38	1,776 Bbls.	16/64	34	5,284
	Hollyfield & McFarlane	T. M. Kilgore #1	6/26/38	297 Bbls.	16/64	34	5,395
	Magnolia Petroleum Co.	Sallie Lloyd #2	6/6/38	960 Bbls.	3/4	34	5,297
	Magnolia Petroleum Co.	Sallie Lloyd #3	6/23/38	1,040 Bbls.	3/4	....	5,270
	Morelock & Bevill	T. M. Kilgore #2	6/7/38	2,016 Bbls.	3/4	....	5,402
	Oakes, Caruthers & Morelock	H. W. Patton #1	6/17/38	254 Bbls.	10/64	34	5,351
	R. P. Oden & R. L. Taylor	J. J. Henry #1	6/12/38	192 Bbls.	16/64	34	5,136
	Sells Petroleum Co.	C. S. L. Patton #A-2	6/21/38	480 Bbls.	3/4	34	5,398
	Skelly Oil Co.	Laura Enloe #1	6/2/38	388 Bbls.	24/64	34	5,239
	Sklar Oil Corp.	T. M. Kilgore #2	6/12/38	1,584 Bbls.	16/64	34	5,271
	Sloan & Zook	T. F. Patton #1	6/10/38	528 Bbls.	....	34	5,383
	G. H. Vaughn	English #1	6/17/38	960 Bbls.	1/2	34	5,091
(Lincoln Ph.)	Magnolia Petroleum Co.	Patton Heirs #2	4/20/38	259 Bbls.	3/4	34	5,398
	Magnolia Petroleum Co.	Pollock Heirs #3	4/28/38	777 Bbls.	3/4	34	5,312
	Harry Fotiades	Henry #1	6/11/38	1,440 Bbls.	32/64	34	5,246
	O. K. Oil Co.	L. L. Lowery #1	6/21/38	1,320 Bbls.	3/4	34	5,336
LOGANSPORT (De Soto Ph.)	The Hunter Co. Inc.	E. F. Parker #1	6/2/38	4¼ MCF	....	....	5,187
MONROE (Morehouse Ph.)	Southern Carbon Co.	Miles #4	4/21/38	2 MCF	....	....	......
	Southern Carbon Co.	Miles #5	5/25/38	4 MCF	....	....	2,187
PINE ISLAND (Caddo Ph.)	J. Thomas Driscoll Inc.	Satalite Schaefer #2	4/19/38	105	....	....	2,190
	Midfield Oil Co.	George Wells #2	4/21/38	130	....	....	1,793
	Simplex Oil Co. Inc.	Muslow #5-A	4/20/38	187	....	26	2,196
	Magnolia Petroleum Co.	Dillon #25	5/4/38	94	....	38	1,650
RODESSA (Caddo Ph.)	Gulf Refg. Co.	H. A. Allison #2	4/23/38	316	22/64	43	5,998
	J. S. Rushing	Nora Gibson #1	4/27/38	588	18/64	42	5,965
	Shell Pet. Corp.	U. S. Mineral Land B-2	4/9/38	78	1/4	....	5,988
	Shell Pet. Corp.	U. S. Mineral Land B-3	4/11/38	82	1/4	....	5,970
	Shell Pet. Corp.	U. S. Mineral Land B-4	4/10/38	91	1/4	....	6,005
	Shell Pet. Corp.	U. S. Mineral Land B-5	5/3/38	214	1/4	....	6,010
SHONGOLOO (Webster Ph.)	Magnolia Petroleum Co.	Sexton Unit #1	6/3/38	279 Bbls.	5/16	....	10,462
SLIGO (Bossier Ph.)	Triangle Drlg. Co.	H. L. Skannal #A-4	5/2/38	494 Bbls.	....	42	3,140
SUGAR CREEK (Claiborne Ph.)	Union Producing Co.	Coleman Unit #1	5/25/38	40 Bbls. & 50 MCF	....	....	5,847
URANIA (La Salle Ph.)	Arkansas Fuel Oil Co.	Urania WA-7	6/23/38	100 Bbls.	....	22	1,509
ZWOLLE (Sabine Ph.)	Major Oil Co.	Chas. Henry #2	5/20/38	170 Bbls.	....	....	2,444
	Harry N. Morris	Irving & Bishop #1	5/25/38	60 Bbls.	....	39	2,495
	Sutton-Zwoole Oil Co.	Sabine Lbr. Co. #1	5/15/38	504 Bbls.	3/8	33	4,208
	Major Oil Co.	Chas. Henry #3	6/5/38	432 Bbls.	3/16	40	2,530
	Major Oil Co.	Bowman Hicks #1	6/19/38	480 Bbls.	1/4	40	2,398

Louisiana Natural Resources Go Places!

(Continued from Page 27)

of Commerce and John L. Taylor, member of the Chamber Committee, met us at the train, and arranged for our transportation to the shrine. The Woman's Guild of the Springfield Civic Orchestra Association took us on a tour of the city and also sponsored the Louisiana Symphony Orchestra concert given that night in the Centennial Building Auditorium.

In spite of some rain, our party enjoyed "Chicago City" to the utmost. Visits were made to the Field Museum which was within easy walking distance from the car. We of the Conservation Department found a thousand things of interest in the mounted displays of wildlife, large habitat groups and beautiful arrangements of fish and sea life.

We lunched as guests of the Swift organization. Saturday night we visited Chinatown, the Ghetto and other foreign colonies and dined at the picturesque WON KOW restaurant.

Fort Wayne, Indiana, and then Detroit! The exhibit car continued to draw crowds and we fed a steady stream of Louisiana literature into eager hands. We spent a happy morning at the Ford Motor Plant, and ate a most delectable luncheon in the spacious dining room.

The grandeur of Niagara Falls was far beyond my wildest imaginings! Delightful, too, was the park and the appetizing breakfast, eaten in the quaint, old-fashioned Cateract House.

Upon our arrival at Buffalo we were swamped with visitors. Schools were still in session at most of the stops and sometimes we had to form the children into groups and put a grown person in charge in order to let them all have a chance to see the exhibits.

We reached New York in the morning and rushed to our hotel to receive letters, cards and wires. What fun to shop, to ride in the subway, to go to Radio City, to broadcasting stations, to upper and lower New York, to Morningside Drive, to the Hudson Palisades, and to Central Park. A delightful cruise on the East and North Rivers was arranged for us by Mayor La Guardia. We saw the Navy Yard, Blackwell's Island, Ellis Island and the Statue of Liberty. We hated

(Turn to Page 49)

The Gun Perforator

A Technical Aid in the Safe Production of Oil

By
F. O. BOHN

The collapse of booms in industrial production has always necessitated economic readjustment of quantity and methods of production. Such was the case in the oil industry following the collapse of markets and values in our late economic depression. During boom times production from prolific zones had been sought in expeditious and unenlightening procedures. The necessity of obtaining returns from capital invested in wells which had depleted the bonanza fostered a new movement in directed efforts for the economical reclamation of suspected petroleum reserves.

This work developed the need for a tool which would profitably provide positive means for egress and ingress of fluids within or surrounding casing that excluded possible production. The tool necessary for this had to effectively penetrate one, two and sometimes even three separate strings of casing and any other resisting substance, such as cement, within or around the casing, as well as the formation surrounding the casing. It also had to be effective under adverse conditions involving large hydrostatic heads and high formation pressures. The tool had to be controlled for accuracy of results, for safety in application and for safety in operation.

In order to fulfill the requirements of effectiveness, accuracy and safety, it was decided that an attempt would be made to develop an electrically fired gun for perforating work. After several years of experimentation, research and field trials, the Lane-Wells Company was able to offer to the industry a tool which it had demanded.

Basic Principles of Operation

Although the present type gun perforator has many improvements, refinements and evidences of continuous modernization, it still operates according to the basic principles which were carefully laid out for the original model. The desired perforations are obtained by hurling a heat-treated solid steel projectile through the casing. The impetus of the bullet is accomplished through the combustion of smokeless powder in a chamber which has the characteristics of a gun, effectively sealed against the entrance of fluids under great pressure. The powder is ignited by the heating of a filament properly included in an electrical circuit within the chamber. A number of these chambers, when made up into a gun body, constitute a gun which includes within itself electrical wiring and equipment necessary to control the individual firing of each chamber. Control of fire for individual chambers is accomplished by the use of a controller, an electrically operated switch which divides a single source into selected circuits which fire one chamber independent of the others.

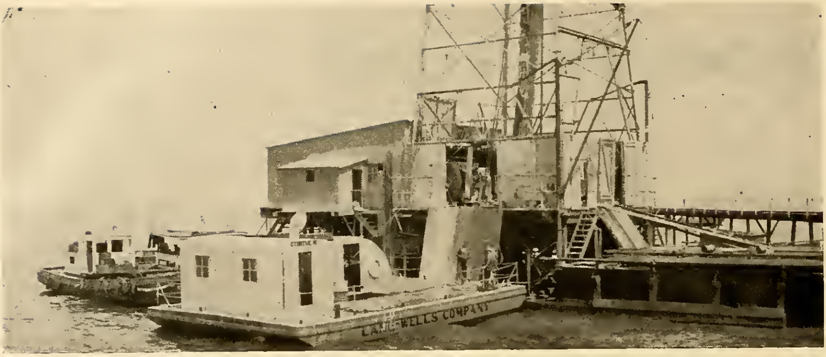
The inventive genius of science has developed and perfected many instruments to expedite the location and recovery of crude oil from greater and greater depths, but none more amazing than the gun perforator, with its electrical device for the discharge of steel projectiles through the well casing. Truly, one of the marvels of this golden age of oil!

The electrical energy used in the firing and fire control of the gun is transmitted through a specially constructed wire line, which also acts as a means of suspension of the gun. This preformed plow steel line has an insulated copper conductor for a core rather than the usual hemp center in a soft laid line. When the gun has been lowered to the desired depth, an electric current is impressed on the conductor of this line. The energy imparted travels down the line through the switching device and into the circuit of the correct chamber to fire a bullet into the formation at a predetermined depth. In order to accomplish this with the greatest possible speed, accuracy and safety, a specially equipped truck is used to perform the operations of perforating a well.

Hoisting Equipment Powerful, Flexible

Hoisting equipment, built into the truck, is sufficiently powerful and flexible in operation to overcome almost any hazard encountered. The drum which contains the shooting cable is equipped with electrical slip ring connections, so that the firing circuit may be completed at will. This firing circuit originates on a panel which is directly before the trained shooter controlling the operation. This firing circuit is protected by no less than five separate safety devices and controls. One safety device which supersedes all firing controls is operated on the rig floor by a second member of the crew. Because the gun is fired by controlled electricity and not by percussion-caps or other inconsistent means, premature discharge is impossible.

The panel containing the firing controls also includes meters for visual indication of the tension on the shooting line and the depth of the gun itself. The motion of these meters is derived from precise mechanical measuring devices mounted over the hole on the rig floor. The two parts are locked in synchronism by a special electrical system, which is enclosed by vaporproof connections in order to eliminate fire hazards. The mechanical measuring devices which actuate the weight and depth meters on the panel consist of a sheave and spring suspension assembly. The sheave is ground to a certain diameter as determined by the diameter of the line. A gear train driven by the sheave is built to have a ratio of such proportions that one revolution of the synchronized counter on the panel represents the passing of one foot of line over the sheave wheel. This measuring device is suspended by a calibrated spring, the motion of which is transferred by gear train and electrical synchronization to a pointer type



■ **Lane-Wells shooting barge on location.**

dial on the shooting panel. The weight indicator dial includes a vernier pointer in order to make indicatons sufficiently sensitive to recognize the fluid level and to positively identify the bottom of the hole. In order to obtain the most accurate results in depth measurements, the hoisting unit is removed from the measuring devices about 200 feet. Because the maximum strain on the cable occurs at the hoist, any particular section of cable will adjust itself to that strain before it passes over the sheave.

Set-up for Well Perforation

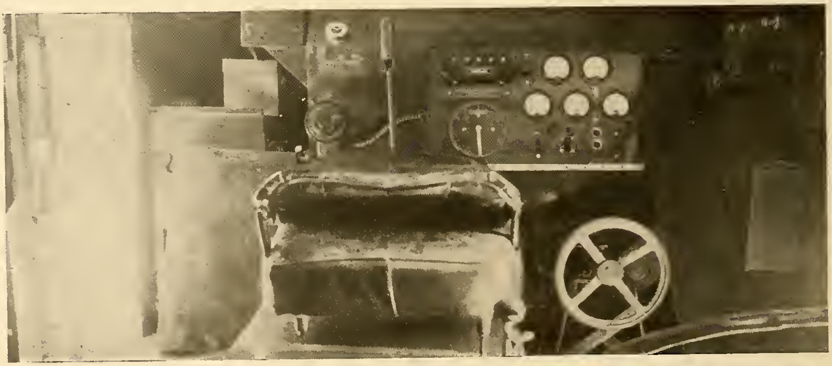
The set-up necessary for perforating a well is made in the smaller part of an hour. This can be done because the truck contains everything necessary in the operation. The only requisite material that the operator must furnish is a means of suspending the measuring equipment. No power supply is necessary, for the truck contains generators with capacity sufficient to operate the equipment as well as furnish illumination for night work. The truck also carries equipment for safe-guarding a well against blow outs. A special pack-off assembly seals the line in the casing. Using this device, pressures subsequent to perforating may be held in control. Likewise, perforations may be made under existing pressures.

Although the gun perforator was developed with only a few applications in mind, its continuous use and success in the field has brought about many new applications. The original application in plug-back work is still of prime importance. In this work productive zones above depleted sands are put on production by perforating the casing. In conjunction with this work the perforator is used as an exploratory tool when well logs are incomplete or non-existent. Exploration is carried on by providing the means of testing formations at intervals throughout a zone which is thought to have possibilities. Testing is accomplished by drill stem tests through the perforations. After plugging-back to some such zone, production is obtained through perforations.

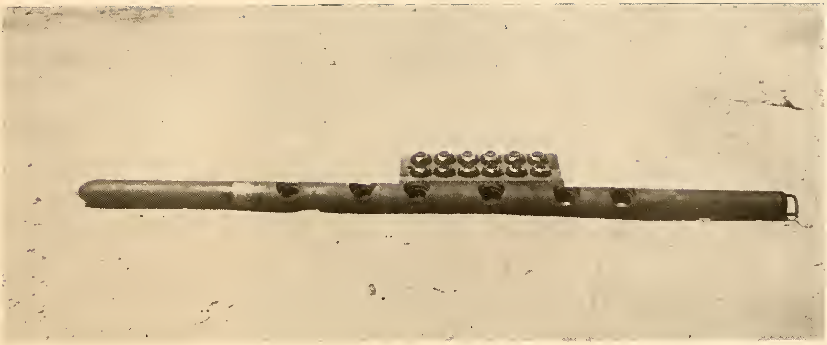
Used for Entrance To Water Sands

Often the exploration as described above will expose the existence of water in the vicinity of a productive zone. In places such as this the gun perforator may be used to great advantage. Using it to gain entrance to the water sands, cement may be squeezed out into the formation to seal off the water. In event that water troubles are not eliminated on the first squeeze job, a second set of perforations will prepare the well for another trial at a water shut-off.

The success in completing a well in a plug-back operation led to another application of the gun perforator—that of the selective method of initial completion. In this routine the casing or blank liner is set through the sand and cemented in place. Enough cement is used to



■ **Operator's control board for gun perforation.**



■ **Gun perforator and chamber of projectiles.**

seal off water, oil and gas sands that may be present. Then the well is brought in through perforations placed in a selected zone that is directly opposite the saturated portion of the oil sand. The cement job in most cases prevents encroachment of water and gas through the channeling of formations.

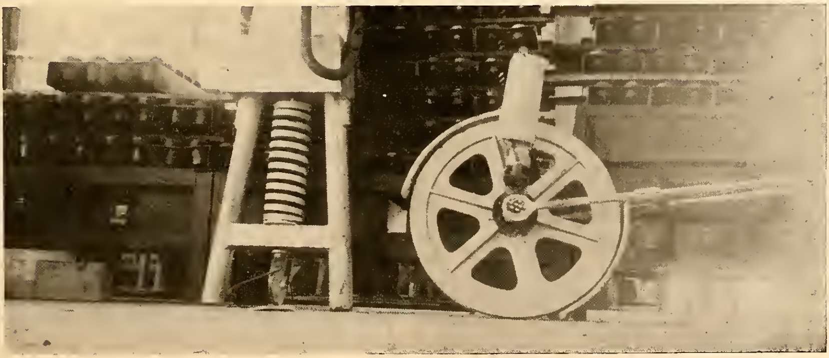
Completion through the above procedure is quite adaptable in the control of gas-oil ratios. For purposes of natural resource conservation, as well as efficiency of production, it is well to hold the volume of gas produced to the minimum necessary to flow the well. If the well was originally completed by setting the casing above or partially through the sand, a blank liner is cemented in the sand. The liner is then perforated low in the sand body. If a large gas volume persists, another attempt can be made by doing a squeeze cement job through the perforations present and then testing the production through new perforations lower in the sand body. The accuracy that is possible in gun perforating casing has made this type of completion very successful, even in very thin bodies of sand. Wells have been completed for pipe line production from sands only one and two feet in thickness. In a case where conditions are opposite to those mentioned above, it might be desirable to increase the gas flow. Then perforations are added in an upward direction until the desired gas volume has been obtained or proven to be utterly lacking.

Assisting In Ultimate Recovery

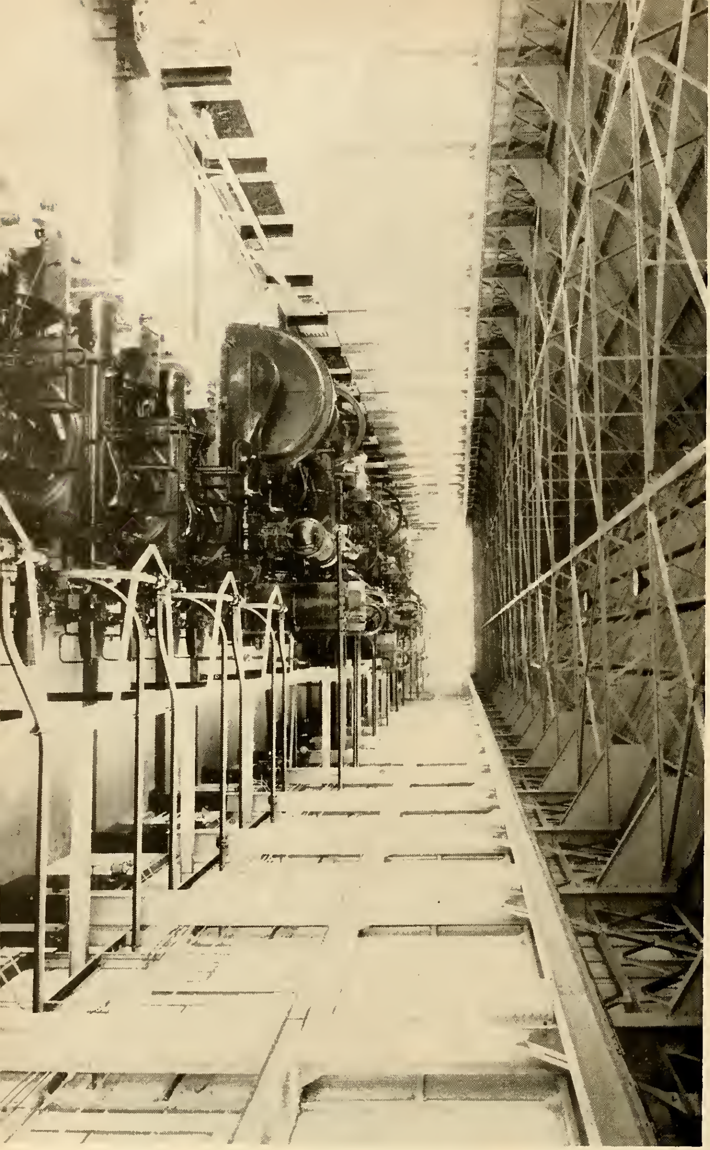
In fields where production is obtained entirely through water drive or in combination of gas and water drive, the gun perforator has done much toward assisting in ultimate recovery. In this adaptation the well is completed through perforations placed as low as possible in the sand body without obtaining water in the oil produced. This does much toward conservation of the gas that might be present. As the water table rises, the perforations guilty of water production are cemented off. Step by step the oil is drawn from the top of the rising water table until the reservoir is depleted. This is a very efficient means of production.

The present methods of drilling call for many technical aids in obtaining accurate logs of formations encountered throughout the depth drilled. With positive knowledge of the location of possible productive zones, the well may be conditioned for economical plug-back work after the depletion of the major sand. In this program all commercially important zones are cemented in preparation for production free from water. This stage comenting of all future productive zones is greatly facilitated by gun perforation. By establishing circulation between two sets of perforations, the formation between the perforations is conditioned for better success in the subsequent squeeze job. When this

(Turn to Page 49)



■ **Close-up of gun perforator equipment.**



■ Compressor building of large scale hydrogenation plant. Compressors for compressing and recycling hydrogen.

Hydrogenation and the Petroleum Industry

By

J. B. FERCHAUD, JR.*

The connection between the cracking up of molecules and the cracking up of giant airliners may not be quite clear to the groundling who follows with shaded eye the swift passage of an aeroplane across the sky, yet a connection there is, an important, vital connection, for success and safety in aviation depends not alone on sturdy framework, graceful wings, numerous navigation gadgets, and two-way radio instruments. It depends as well on the development of higher types of fuel to power the high-speed motors; fuels that guarantee power in emergencies, that furnish a maximum of sustained power with a minimum of weight. Future development of aviation depends largely on development and production of higher grade gasolines.

These gasolines, of course, come from crude oil, and the crude oil from a well,—but what of the transition? The invention and perfection of processes to bring about this transition have been developing for many years. Of the many processes, one stands out from all the rest,—hydrogenation.

Hydrocarbons, and aviation's crude oil and gasoline fall under that heading, are made up of molecules, which in turn are made of atoms of hydrogen and carbon arranged in many different molecular patterns. The relative number and the exact arrangement of these atoms in the molecule determine the characteristics of the finished product. It is by means of hydrogenation, as well as other refinery processes such as cracking and polymerization, that we are able to disintergrate these molecules and arrange the atoms in definite patterns to give us products of a desired quality.

The possible practical application of hydrogenation as a petroleum refinery process was definitely mentioned in 1926 at the International Conference on Bituminous Coal held in Pittsburg. The hydrogenation of coal and heavy oil residues was discussed in reports by two distinguished researchers of the time. Dr. Franz Fischer discussing a process developed by himself demonstrated how hydrocarbons could be synthesized from coal or coke and water by the use of heat in the presence of a catalyst, such as an oxide or mixture of oxides of heavy metals.

Dr. Friedrich Bergius Entitled to Credit

It is to Dr. Friedrich Bergius, however, that most of the credit for the hydrogenation process goes. His discussions brought out the results of many years of intensive research in the hydrogenation of coal and heavy oils into petroleum hydrocarbons. His method, which is entirely new, consists of treating finely pulverized coal mixed with heavy oil residues with hydrogen in the presence of a catalyst and under high temperatures and pressures.

■ **General view of Baton Rouge hydrogenation plant. Hydrogen production furnaces at right end of plant, catalyst chambers within concrete stalls at left end of plant.**

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* Chemical Engineer, Department of Conservation.

■ **Corner view of hydrogen furnaces at Baton Rouge hydrogenation plant. Compressor house at right.**

From the reports presented at that meeting it was demonstrated that a ton of coal will produce 140 gallons of oil similar to petroleum, containing about 25 per cent of anti-knock motor fuel. It was shown that only a small two ton plant was operating in Germany and that the process was still in the experimental stage. That a large number of problems still remained to be solved; that many difficulties, both scientific and economic, had to be eliminated; and that the process was still definitely in the transition stage between the laboratory and commercial operation were the important points emphasized in connection with this process.

It was an agreement between the Standard Oil Company of New Jersey and I. G. Farbenindustrie, A. G. of Germany, the latter controlling the new process, whereby the Standard was to control the American rights, that greatly helped its future commercial possibilities. As a result of this agreement the Standard I. G. Company was organized to handle the development of the process, and the Hydro Patents Company was formed as a medium through which the process could be licensed to the industry in general. The stock of the new company was divided between 17 refining companies in proportion to their refining capacities. To the individual refiners who at first feared that this new process might mean revolutionary and disastrous changes this company gave considerable relief, for they knew that with 80 per cent of the refining industry involved in its development the hydrogenation process would be used constructively for the best interests of all concerned.

Orderly Development of New Process

That the independent oil refiner need not have any fear of this new process was definitely assured, not only by the leading interests in their well planned development program, but also by the maufacturing branch of the industry. This branch due to its super-efficient technical control, could produce gasoline at such a low price that no new process could hope to compete with it under existing conditions. Due to these things and also the fact that from a standpoint of economics, the hydrogenation process will evolve orderly and gradually without disrupting any existing structure in the petroleum industry.

This economics, relating to hydrogenation, concerns the fact that as long as the other products, such as fuel oil, that present day practice produces from a barrel of crude oil, commands a price comparable to that of the gasoline, then hydrogenation will be a specialized field and will offer no serious competition for other refinery processes. Thus having no fear of the sudden effects of the hydrogenation process and seeing immediately that its evolution will be toward the manufacture of higher grade motor products, the entire petroleum industry will help in its complete development.

The hydrogenation process originated because of an economic necessity and was not the result of pure scientific research work. In Germany, around 1910, the production of gasoline from crude oil could not meet the ever-increasing demand. It was with this grave problem on their hands that the petroleum industry of Germany persuaded Dr. Friedrich Bergius to find new ways of increasing the yield of gasoline from a barrel of crude oil. With this goal in mind Dr. Bergius originated the hydrogenation process after several years of intensive research.

It seems at first sight that hydrogenation as a refinery process in the United States is not necessary due to the enormous petroleum supplies. However, in many present refinery processes, especially in cracking operations, there are great quantities of residues having a comparatively low commercial value. It is by means of hydrogenation that these low value products can be converted into high grade products such as motor fuels, kerosene and lubricants. If eventually all refinery residues of a liquid

■ **End view of Baton Rouge hydrogenation plant, showing furnaces for hydrogen production.**

character can be mixed with coal or coke and converted into more useful liquid products by means of hydrogenation it will not only be a considerable advantage to the industry but another step toward conserving our natural resources in liquid fuels.

It is with the incentive, both of gain to themselves and the conservation of natural resources, that the industry is looking for and adopting, whenever possible, new methods of oil conversion and refining.

Hydrogenation consists essentially of destroying the structure of the entire molecules of these heavy residues and similar products, and adding hydrogen to form lighter hydrocarbons resembling the better grade products of the refinery. In this process the oil feed and fresh hydrogen are separately compressed to 200 atmospheres. After these are mixed the mass passes through a heat exchanger counter-current to the products of hydrogenation. Then the mixture is heated in a fired coil, thence passed to the catalyst chamber where conversion to the desired products takes place. The products of reaction go through a heat exchanger and cooler, then to a high pressure separator where the unreacted hydrogen is separated and recycled by booster compressors. The liquid hydrogenated product is then released to lower pressure and stabilized by removing the gaseous fractions lighter than butane and some of the butane itself.

The advantages that may be gained by the complete perfection and universal adoption of hydrogenation as a refinery process is to be seen in many instances.

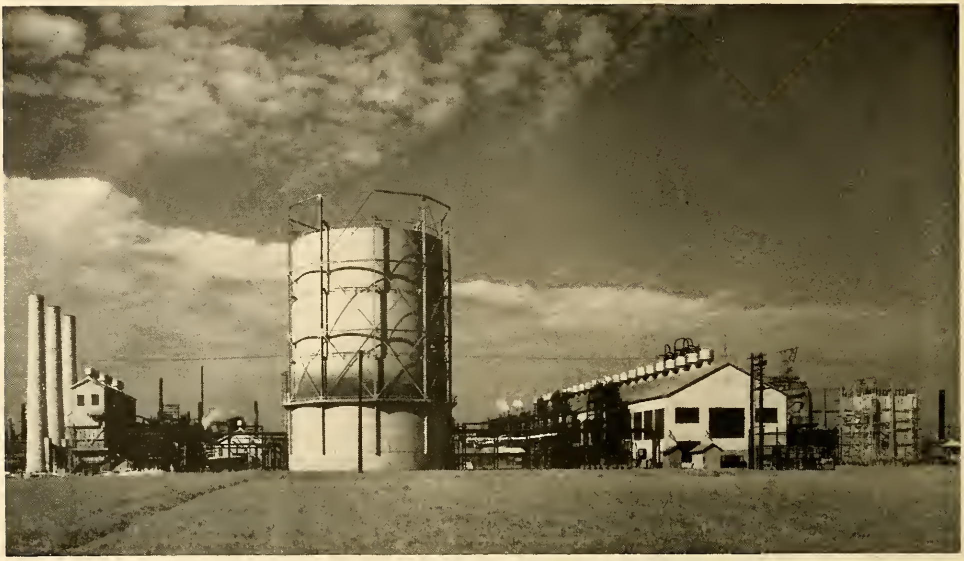
Greater Yield of Gasoline Assured

From the standpoint of conservation the new process will mean that the yield of gasoline from a barrel of crude oil will be in the neighborhood of 100 to 150 per cent. It is this greater yield that will prevent prices high enough to restrict consumption. It will remove fuel oil from competition with cheap coal because due to the greater operating control of all products the markets for these products will be stabilized on a representative basis and one or two products will not have to bear all the burden. The higher quality of the products will place them in a premium class. All these things definitely assure the ability to regulate output of products in accordance with demand and thereby will place the entire petroleum industry on a sounder basis than ever before in its history.

A further great advantage of this hydrogenation process is that it will add greatly to our potential petroleum reserves, removing any fear of exhaustion of our petroleum resources or at least postponing this fear indefinitely. This will mean greater investments in oil enterprises with the subsequent expansion of the industry.

Until the advent and subsequent development of the hydrogenation process for commercial operation, aviation fuels of high anti-knock values have been limited in available quantities. Virgin naphthas from only select grades of crude oils have been the only source for production of large quantities. However with the new type of catalyst the hydrogenation process is able to manufacture aviation naphthas equal or superior to those of virgin naphthas. With these naphthas produced on a commercial scale the potential supplies of high grade aviation fuels have seen a marked increase. Another great benefit of these hydrogenated naphthas over the virgin naphthas is that the former require less of the high anti-knock blending agents for a given octane number. Besides their value for use as fuel these naphthas have another use and that is as base stocks with commercial isooctane in the preparation of 100 octane number fuels.

One of the latest installations for this process is a hydrogenation plant



■ **Side view of Baton Rouge hydrogenation plant. Hydrogen furnaces at left, hydrogen gas holder in center, compressor house in middle right and converter stalls at right.**

operating in conjunction with a catalytic polymerization unit which was recently erected by the Standard Oil Co. of California at their Richmond, California refinery for the purpose of making aviation gasoline of 100 octance value, high-ignition quality diesel fuels, or base materials for the manufacture of special naphthas.

Position of of Hydrogenation In Refinery Process

This hydrogenation plant is directly tied into that of the polymerization unit and both are linked with the operation of the cracking units, showing the exact position of hydrogenation in the refinery process. All three of these units are tied together by the fact that olefinic hydrocarbons are made in the cracking operations and these serve as the charging stock for the polymerization unit. The products of the polymerization unit are then hydrogenated to manufacture the 100 octane aviation gasoline.

This new plant is one of four commercial hydrogenation plants completed in the United States. The other plants are located at the following refineries: Standard Oil Co. of Louisiana, Baton Rouge, the Gulf Refining Corporation, Port Arthur, Texas, and Standard Oil Co. of New Jersey at Bayway, N. J.

The pictures shown with this article present several views of the hydrogenation plant at the Baton Rouge refinery of the Standard Oil Company of Louisiana. This plant is making about 6,000 to 7,000 barrels per day of aviation gasoline and a co-dimer which is used in making commercial isooctane for 100 octane number aviation fuel.

In the United States due to present day conditions hydrogenation is placed in a specialized field; that of making aviation gasoline or a base for this product. However, due to the greater yields, 100 to 120 per cent compared to 60 to 70 per cent for the cracking process; and due to the superior grade products, having qualities such as higher octane number, almost complete reduction of sulfur (if any is present) due to the catalyst used, and reduction of gum forming tendency, the hydrogenation process can and does make motor fuels when the demand justifies.

To summarize, we are assured that hydrogenation will reach an exalted position in the refinery process in the future due primarily to its ability to manufacture a barrel or more of gasoline out of a barrel of crude oil. Due to this ability the proportion of lighter products obtained from crude oil will be increased as needed, thus the load on crude production will be reduced, the present over-supply of heavy oils can be lessened and there can be gradually achieved a steadier equilibrium between supply and demand, and a further reduction in actual refinery wastes.

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Note: The author wishes to express his sincere appreciation to Dr. J. E. Miller, in charge of the hydrogenation plant at the Baton Rouge refinery of the Standard Oil Company of Louisiana, for his help in securing the pictures accompanying this article and for his many valuable suggestions which greatly aided in its writing. To Mr. A. Voorhies, Jr., with the Development and Research department of the same company the writer wishes to extend thanks for his constructive criticisms.

What Palms Grow In Louisiana

PART IV*

By

MIRIAM L. BOMHARD

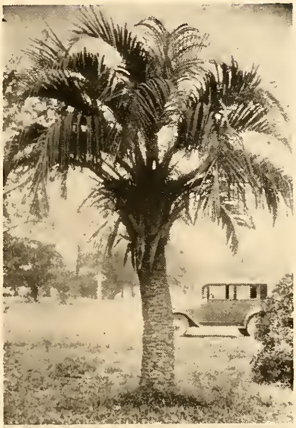
Butia Becc. Butia palms.

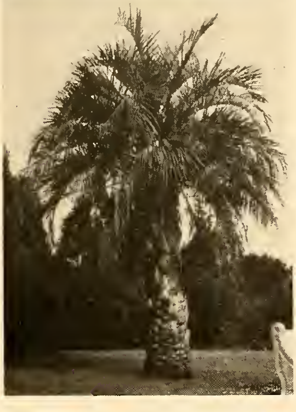
Distinguishing features: The numerous leaf segments are attached to the rachis folded downwards (like a Λ); the petioles are margined with flattened, spike-like spines, often also with coarse fibers; the foliage is grayish green in most species.

These medium-sized, hardy, feather-leaved palms are native to Brazil, Paraguay, Uruguay, and Argentina, where they grow in fields and on sandy plains, often occupying extensive areas. The genus name, Butiá, is also the native South American name of these palms. Although the plants of this genus were definitely separated from *Cocos* in 1916, gardeners and nurserymen have been unusually slow in adopting the new name. All the species and varieties of *Butia* were for years grouped under the horticultural name of "*Cocos australis*". It should be clearly understood that the coconut palm, *Cocos nucifera*, is now the only species retained in the genus *Cocos*.

Because of their hardiness, ease of culture, and handsome growth-habit, distinguished by the long, curving, usually grayish green leaves, Butias have come to be favorite ornamentals in warm-temperate climates. They grow slowly and are not likely to get "out of hand", as do so many palms. The appearance of the various kinds is very similar—the botanical distinctions are based mainly on fruit characters. Unfortunately, the botany of these palms has not been clearly worked out.[1] Moreover, some species and varieties have been based on a few (or even one) cultivated palms, probably themselves hybrids. In view of this fact, it is not surprising that there is confusion as to names in the nursery catalogues, but it is reassuring to know that a Butia purchased under almost any name is bound to be a beautiful hardy palm, whether it is a "good" species or not.

My observations show that Butias thrive under Louisiana conditions—measurements of the leaves, spathe and spadix usually exceed those given in the original descriptions. By far the greatest number of Butias cultivated in the United States are to be classed under the Brazilian Butia (*B. capitata*) or its varieties (Fig. 24). The following species may be listed for Louisiana: *B. capitata* with two varieties, *pulposa* and *virescens; B. eriospatha* and its subspecies, *punctata;* and *B. bonneti.*





Top (Fig. 30). Greenleaf Butia (B. CAPITATA var. VIRESCENS). Audubon Park, New Orleans. Bottom (Fig. 24). BUTIA CAPITATA. West End Park, New Orleans.

Butias were first introduced into Florida about 1875. They have been grown in Louisiana since before the beginning of this century. However, the full possibilities of utilizing Butias where a tropical effect is desired in a climate where the winters may occasionally be severe are only beginning to be realized. Plantings along the Gulf Coast have increased decidedly in recent years.[2] Butias have even proved successful outdoors in northern Louisiana when given winter protection.

Butias have a single stout trunk, which may retain the heavy petiole bases (boots) for a long time. Most of the species do not exceed 20 ft. in trunk height. The leaf segments usually stand at an upright angle to the rachis and are generally fairly evenly spaced (sometimes in 2's), except for a group of narrow, bunched segments at the beginning of the "blade" (Fig. 25). The petioles early become separated from the coarse, fibrous leafsheaths as can be seen by the very ragged, "shredded" margins of the young petioles. As the shreds gradually wear away, the flat, spike-like spines characteristic of the mature petioles can be seen. The upper spines are usually shorter, curved, and resemble claws or teeth. The older boots on plants of fair size show no spines whatever. (Compare Fig. 4, upper right, with Fig. 26).

Butias begin to flower long before any appreciable trunk has formed. Each spadix (flower cluster) is borne inside a long, club-shaped spathe, which is rounded (not compressed and wing-margined as in the date palms) and ends in a beak or point.[3] The spathes open by splitting lengthwise (Fig. 27). They are from 2½ to 6 ft. long and up to 9 inches wide in the broadest part, differing with the species or variety. The outer surface may be smooth, *glaucous* (whitish with a waxy bloom), woolly, etc. The inside is always smooth and shining when first open and usually a shade of yellow or pink. Interesting changes occur both in the color and the texture of the outer and inner surfaces as the spathe matures. Each plant produces from 5 to 9 spathes in a season; in southern Louisiana, these appear progressively from May through June or into July, when it is possible to find unopened spathes as well as mature fruits on the same tree.

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* Note: Reference should be made to Parts I to III for explanation of technical terms used in the discussions of genera and species and for Figs. 1 to 23.

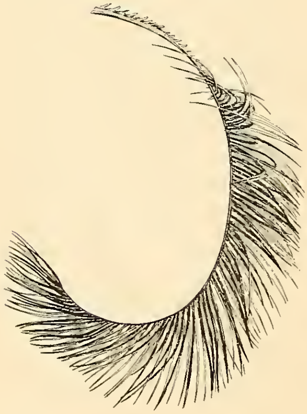
[1] Dr. Liberty Hyde Bailey, eminent palm student, has recently published a very useful treatise on both *Butia* and *Arecastrum,* which should be consulted by everyone interested in these palms: Gentes Herbarum, vol. IV, fasc. I. September, 1936. Published by The Bailey Hortorium at Ithaca, New York.

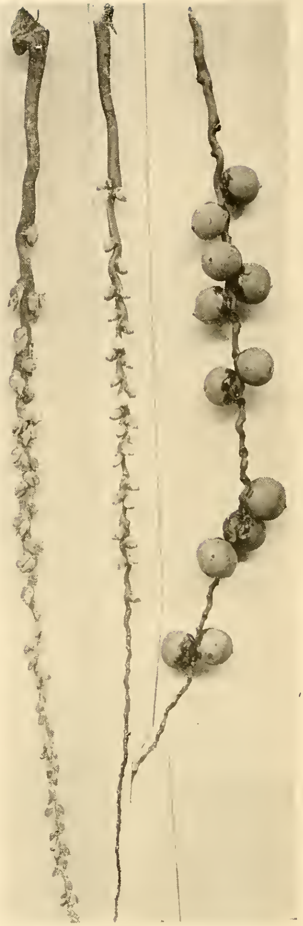
[2] The Parkway Commission of New Orleans has set out hundreds of Butias on boulevards connected with the new Airport development.

[3] A fibrous structure, which is actually a second spathe but seldom noticed in the midst of the leaf bases, encloses the main spathe.

The spadix is a handsome affair with a stout central *axis*, tapering upwards and bearing 150 (more or less) branches. Butias are *monoecious*, that is, both male and female flowers are borne on the same cluster. Each branch usually has a few solitary female flowers at the base, then 3 flowers together (2 male flowers on either side of and slightly above a female flower), and finally male flowers only crowded at the end (Fig. 28). The beautiful male flowers are star-like, over one-half inch across, and yellowish (often rose-tinged) or deep violet-red in color. Only the female flowers in the lower portion of the branches develop into fruits (Fig. 28). As the female flowers develop into fruits, the sepals and petals (called *perianth*, taken together) continue to grow for a time but soon become dry and brownish; the perianth remains as a flat or cup-like structure at the base of the ripe fruit.

In New Orleans, the ripe orange-colored fruits are produced from June to September. (We have none of the red-fruited Butias.) The skin is thin and like that of an apricot. The fruits average one inch (more or less) in height and are, in general, nearly round or ovoid. Those of most species are edible, having a delicious flavor and delightful fragrance, and make excellent wines and jellies. The pulp, of yellowish color and rather stringy consistency, adheres closely to the nutlet within in some species but separates easily in others. The very hard, woody nutlets look like miniature coconuts with the 3 "eyes" or germ-pores clearly visible at or below the middle.





Top (Fig. 28). Left—Branch of spadix, showing male and female flowers. Center—Male flowers have dropped off. Right—Fruit, nearly mature. (B. CAPITATA).

Bottom left (Fig. 25). Typical leaf, showing erect attitude of segments and spinous petiole (B. CAPITATA).

Bottom right (Fig. 29). Stages in fruit development, with nutlet (lower right). Bigfruit Butia (B. CAPITATA var. PULPOSA).

B. Capitata (Martius) Becc. *(Cocos capitata)*. Brazilian Butia.

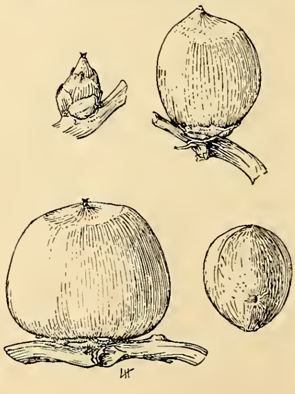
The Latin adjective, *capitata*, means "with a head". Possibly this species was so named because of the headlike effect of the green upper leaves of some of these palms in a burned-over area; perhaps because the normal leafcrown is so dense. One of the native names for this species is *cabeçudo* (thick-headed). This palm is widely distributed from east-central to southern Brazil and into Uruguay. There are a number of named varieties. Figs. 24, 25, 27, and 28 illustrate the typical form.

As has been previously stated, most of the Butias in Louisiana are of this type. They are compact, stout palms bearing a heavy crown of curved or arching, grayish green leaves, 10 ft. or more long and averaging 70 segments on either side of the rachis. Some of our specimens have attained full growth—the trunk height is 16 ft. and the diameter, 2½ ft. at the ground line where the boots have been shed.

The spathes, about 5 ft. in length and 8 inches in width, are smooth on the outside, pale glaucous green at first, but dull yellowish brown when mature. The inner surface changes from pinkish yellow when first open to yellowish brown. The spadix axis is creamy-pink at first but soon becomes glaucous; it bears about 170 branches with yellow (sometimes pink-tinged) flowers. The fruits show considerable variation in size and shape on different trees, but are, on the whole, more or less round, conic above and flat below, and about 1 inch high. The pulp clings rather closely to the nutlet within; the flavor is very agreeable but somewhat more tart or acid than in some of the other Butias. Natives employ the fruits for making vinegar.

B. Capitata var. Pulposa (Barbr.-Rodg.) Becc. *(Cocos pulposa)*. Bigfruit Butia.

The varietal name, *pulposa*, refers to the large, pulpy, edible fruits, over one inch high and up to 1½ inch wide. Fig. 29 shows stages in fruit formation and a nutlet. The mature fruit is shaped somewhat like an apple with



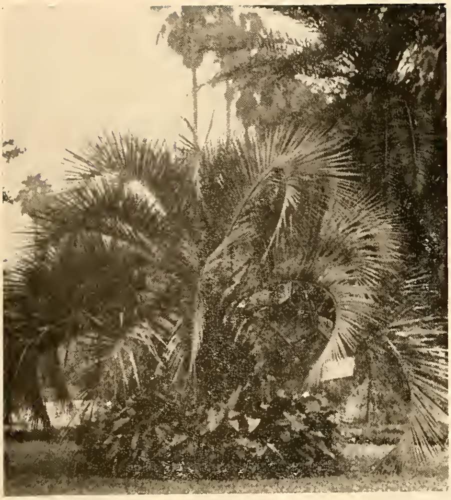


Fig. 31. Woolly Butia (B. ERIOSPATHA). St. Charles Ave., at State St., New Orleans.

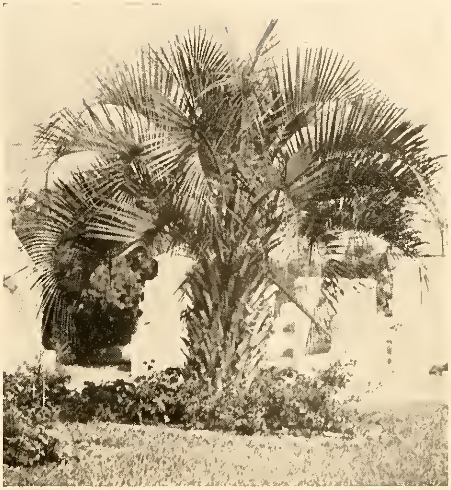


Fig. 33. B. ERIOSPATHA var. PUNCTATA. Metairie Cemetery, New Orleans.

the perianth flat beneath.The fruits are rosy-green when nearly full size but become bright orange when ripe. The South American name for this palm is *butia-assu*—assu means big or large, evidently referring to the fruits. The habit of this variety is very similar to that of the species—our specimens seem more robust on the whole. One must see the fruits of this variety to be certain of its identity. The bigfruit Butia inhabits sandy plains, sometimes forming woods, in southern Brazil. It extends farther south than the species, in a cooler climate.

The leaves of our specimens are somewhat longer than those of the species, with the petiole occupying more than one-third of the total length. The spathes are also very much like those of the Brazilian Butia but are somewhat shorter and narrower, seldom exceeding 4 ft. by 4 in. the spadix has a glaucous axis; it bears yellowish flowers which are often pink-tinged.

B. Capitata var. Virescens

Becc.
Greenleaf Butia.

Virescens means "becoming green". The color of the leaves in this variety approach a true green rather than the grayish green tone characteristic of the genus as a whole. Actually, they are a deep, bluish green on the upper surface and dull green on the under side in our specimens. The deep green color of the upper surface characterizes the entire crown because the leaf segments in all but the newest leaves do not stand up at an angle but lie rather flat and droop over gracefully. The arching of the leaves is not very pronounced, neither do they curve at the ends. This variety is based on a palm grown in a garden in Florence, Italy.

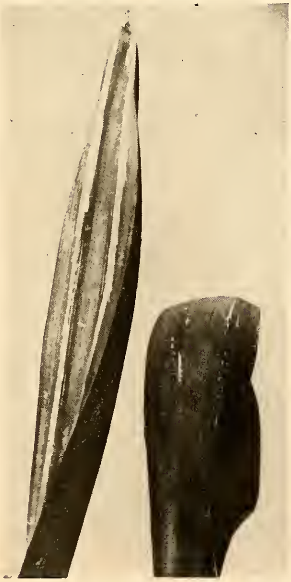


Fig. 32. Woolly spathe (right) of B. ERIOSPATHA. Fuzzy spathe (left) of B. ERIOSPATHA var. PUNCTATA.

The deep green, soft leaves of several Butias in New Orleans at once mark them as distinctive palms. I have tentatively identified them as belonging to this variety although the flowers are greenish yellow with a touch of pink and not somewhat purplish as described by Beccari. The crown is usually more dense than that in Fig. 30, but the habit of the leaves is clearly shown. The segments are mainly opposite and evenly spaced along the rachis. The leaves in our specimens average 10 ft. in length. The latter is armed with stiff, blackish spines. The trunk of the specimen illustrated is prominently marked by the leafscars because it has been closely trimmed.

The spathes, 4 ft. long and from 6 to 7 inches wide, are at first greenish-brown and glaucous on the outer surface and yellow within. The outside slowly becomes dull, greenish brown and rough-scurfy—the scaly material gradually wears away as the spathe dies. The name *virescens* might well describe the axis of the spadix since it is green and smooth and does not become glaucous in fruit. The color of the fruits was originally described by Beccari (in Italian) as "giallo-albicocca", that is, yellow-apricot, or "with the base slightly rose-tinged". Ours are apricot-yellow in color but show no trace of rose.

B. Eriospatha (Martius) Becc. *(Cocos eriospatha)*. Woolly Butia.

The outer surface of the spathes in this species is covered with a dense and deep, reddish brown wool, almost furry or plush-like. The specific name, which combines *erio* (wool) and *spatha* (spathe), is accurately descriptive. This species and its subspecies (next described) seem to me to have the handsomest foliage of all the Butias. It should be more widely planted. The graceful habit of a young palm is illustrated in Fig. 31, which shows the definite swirl or turning of the ends of the leaves as well as their strongly arched or "hooked" character. In southern Brazil, where the woolly Butia grows in fields and often occurs in dense clumps, it attains a trunk height of 17 ft., but we have none so tall in Louisiana.

The leaves average 11 or 12 ft. in length and have 88 to 98 segments on a side; the latter are over 2 ft. long and from 1 to 1⅛ inches wide. The 3 ft. petiole is armed its entire length with rather narrow, spiny teeth, intermixed with many coarse, ragged fibers.

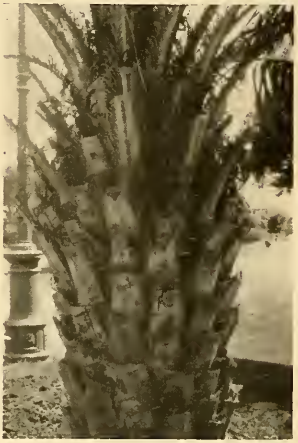
The spathes are widest (between 6 and 7 inches) just below the top; they are usually at least 4 ft. long. The inside, when freshly open, is smooth and pink but later turns a dark red-mahogany color. The glaucous spadix axis, also somewhat fuzzy, bears greenish-yellow flowers. The fruits, about one inch high, are more or less round, but flattened above, and have a shallow, flat cupule. The nutlets are usually longer than wide with the small, dark "eyes" clearly visible just below the middle. In its native home, the fruits of the woolly Butia are frequently used to make an aromatic, fine-flavored wine. They have a delicious sweet flavor when eaten fresh.

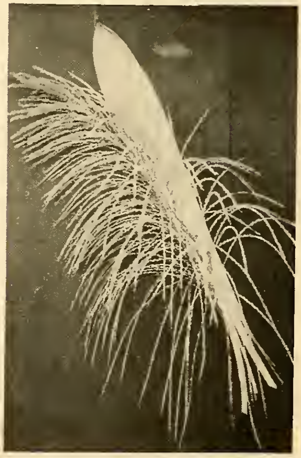
B. Eriospatha subsp.

Punctata Bomhard Dotfruit Butia.

Because of a combination of striking characters which I have found in no other Butia, I have recently described this new subspecies from several plants cultivated in different parts of New Orleans but all showing exactly the same traits.[4] The fruits, almost until they are ripe, have a distinctly dotted or pitted (*punctata*) skin; they also exude a gummy or sticky substance, somewhat resembling pitch, over the entire surface when very young and mainly just above the perianth as they become older. The spathes have a dense hairy covering on the outside, as does the species, but it is shorter—more like thick fuzz and less like fur. Besides, the spathes are the longest of any of our Butias, being nearly 6 ft. in length when mature and up to 6 inches wide in the broadest part (just above the middle) (Fig. 32, left). The spadix axis is very glaucous in fruit.

Both the male and female flowers are purplish-red. Purplish-flowered Butias have been described, mainly as varieties of the Brazilian Butia, but our specimens show no relation to that species. (There are many purplish-flowered Butias in Louisiana which defy classification; it is impossible to assign a botanical name to them.) The female flowers are decidedly triangular or top-shaped, even after they have become young fruits.





Top (Fig. 26). Trunk detail of a Butia showing spines and coarse fibers of petiole margins.

Bottom (Fig. 27). Spathe and spadix in flower (B. CAPTATA).

The ripe fruits have the shape of a small plum and are orange-colored. The leaves are very similar to those of the woolly Butia but even longer; they are not as decidedly "hooked" at the ends (Fig. 33). Excellent specimens may be seen in New Orleans on the neutral ground of Fontainebleau Drive (near Pine) and in Metairie Cemetery.

B. Bonneti (Linden) Becc. *(Cocos bonneti)*. Acorn Butia.

Palms under the name of *Cocos bonneti* have been in the trade both here and in Europe for years but the species was not clearly defined until 1916, when the late Dr. Beccari described it under *Butia*. The specific name honors a French horticulturist named Bonnet, who was the first to fruit it in Europe. Beccari's description calls for a palm smaller in every respect than *B. capitata* with an acorn-like fruit—the perianth encloses the lower third of the fruit—and with small nutlets pointed at both ends.

There is no palm in Louisiana—perhaps none in this country—which fits Beccari's description in every detail, possibly because it is based on several specimens which vary greatly. On the other hand, we have palms which could not possibly be mistaken for either the Brazilian or the woolly Butia, since the leaves are short (8 ft. or less) with stiffish segments, the spathes are small (under 3 ft.) and many of them bear small fruits having pointed nutlets. However, most of our palms do not have strongly curved leaves; in fact, they are more erect than in any of the other Butias. Besides, these specimens differ among themselves as to spathe surface, flower color, etc. Space does not permit a discussion of these variations—they are probably hybrid palms. For the present, at least, some few of these palms might tentatively be referred to the acorn Butia, for want of a better disposition. Most of our short-leaved, small-spathed Butias have a narrow trunk with slender boots often arranged in vertical rows. Two such specimens, which bear the small, acorn-like fruit required for *B. bonneti*, may be seen at the entrance to Metairie Cemetery as well as in other parts of New Orleans.

I am deeply indebted to Miss Anna Haas of New Orleans, who has assisted me greatly over a period of years in my survey of Louisiana palms, for her help in the collection of data concerning *Butia* especially.

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[4] Journ. Wash. Acad. Science. October, 1938.

(Photograph by Bailey.)

■ **Black Skimmers,** ***Rynchops nigra nigra,*** **pass in silhouette against the sunset sky at Freemason Keys, Louisiana.**

Fascinating Bird Lore Presented in Department's "Bird Life of Louisiana"*

By

JAMES NELSON GOWANLOCH

The new bird book "The Bird Life of Louisiana" recently published by the Department of Conservation has already met with unstinted acclaim, not only throughout Louisiana, but from bird students, nature lovers and scientists throughout the United States. Greatly the most important volume ever published on the subject of the birds of Louisiana, this well illustrated bulletin of over 800 pages is a storehouse of authoritative and interesting information regarding a subject that possesses a wider appeal than any other field of nature study. Every one of the more than 450 species and subspecies of birds that have been noted in Louisiana is discussed in this bulletin. Important also are the compiled migration tables which cover records over a period of more than 40 years and indicate both the earliest and average dates of spring arrival, the latest and average dates of spring departure for spring migrants, and the average and latest dates of fall departure of autumn migrants. A 73-page list of publications relating to the birds of Louisiana covers the wide range in time from 1758 when the first illustrated account of the natural history of Louisiana was published down to the latest scientific papers of 1938.

More than 100 new birds (species and subspecies) never before recorded in any publication on the bird life of the State are added authoritatively to the Louisiana roster. Additionally, certain new subspecies are for the first time described by the author of this volume, Dr. Harry Church Oberholser.

New additions to the bird list of the State are always of exceptional interest to the student of wildlife. These include a number of remarkable records of birds not only hitherto unknown in Louisiana but in some instances species of most exceptional rarity in their occurrence anywhere in central and eastern United States.

Such, for example, is the record of the Golden-crowned Sparrow taken at Grand Isle by Ambrose Daigre of the Department of Conservation. This bird, breeding on the Pacific coast from Alaska to central British Columbia, had once before been recorded in the Mississippi Valley (in Wisconsin), and once in eastern United States (in Massachusetts).

The Rufous Hummingbird, a tiny and beautiful creature, also a western species, was twice taken in Baton Rouge, one of the specimens having in some peculiar manner found its

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*Copies of the book may be obtained from the Louisiana Department of Conservation, New Orleans, La. There is a nominal charge of $1.00 to cover cost of handling, express, etc.

(*Photograph by Bailey and Dickinson.*)

The Snowy Egrets, *Egretta thula thula*, here shown on their nests at Avery Island are among the world's most beautiful birds.

way into the Senate Chamber of the State Capitol. Only three other records are known of this bird's occurrence east of the Mississippi River (in South Carolina and Florida.)

The Holboell Grebe, a northern bird that breeds from northeastern Siberia and Alaska through northern Canada and south to the most northern states, is added to the State list on the basis of a specimen shot at Catahoula Lake in LaSalle and Grant Parishes. This individual had wandered far beyond its normal range.

The Sitka Crossbill

Another example of the addition of the new species to the monographic state list is that of the Sitka Crossbill, whose normal range is from the Sitkan district of Alaska southward along the Pacific coast to Central California. A pair of these birds was taken at Mandeville, March 27, 1888, by C. S. Galbraith. Crossbills exhibit one of the most peculiar of the many fantastic bill adaptations birds possess, suggesting at first glance a clumsy deformity. The powerful bill with its crookedly crossed mandibles is really an efficient instrument which enables the bird to tear up the toughest cones of firs and pines, extracting from them the nutritious seeds upon which the species subsists. Crossbills are highly erratic in their migrations.

Two birds, not true species, included for the first time in a monographic state list are the Brewster Warbler and the Lawrence Warbler. Both of these are regarded as actually hybrids of the Blue-winged Warbler and the Golden-winged Warbler. A single specimen of the Brewster Warbler taken in 1899 at Mandeville is recorded by Frank M. Chapman. A single female Lawrence Warbler was taken at New Orleans by Thomas Burleigh on Sept. 13, 1935.

The Sennett White-tailed Hawk is a southern species occurring from middle Texas south to Colombia, South America. Dr. Oberholser discovered in the Kohn collection in the Tulane University museum an individual taken November 18, 1888, at Sabine Station, southwestern Calcasieu Parish. The specimen had been incorrectly identified as a Harlan Hawk, which latter is a rare winter visitor in central and southern Louisiana.

The Ferruginous Rough-legged Hawk becomes a member of the state list on the basis of a specimen observed by George L. Tiebout, Jr., at McCall in Ascension Parish.

The Limpkin, known also by the names of Crying Bird and Nigger Boy, is the only North American member of its peculiar family, a group closely related to the cranes and rails. A bird of Georgia and peninsula Florida, it is here recorded for Louisiana for the first time.

Bird Protection

Speaking of the necessity of bird protection, Dr. Oberholser ably summarizes the situation in the following words:

"Probably the most valuable means of arousing public sentiment for the protection of our birds is the education of all the people to their value and importance. The absolute necessity of preserving the breeding grounds of our water-fowl should be impressed on all Americans. To do this all the unwise drainage operations of the past may be used as a warning for the future. Not only are the breeding and wintering grounds necessary for the protection of our wild fowl, but there must be attractive areas on which, during migration, the birds may rest and feed. The wintering grounds are of much concern in Louisiana because a large quota of the waterfowl actually winter within its boundaries, and sentiment started elsewhere as well as here will travel far and aid in preserving what are scarcely less important than the breeding grounds, the suitable wintering areas for ducks, geese, and other water birds.

"Besides the general preservation of suitable areas, probably the most important, and, in fact, the almost indispensable means of protecting our water and other game birds, is the establishment of as many sanctuaries as possible, both public and private, in which birds at all times can find refuge, or in which, at most, hunting would be permitted only under very careful restrictions. Such refuges can be established by individuals alone or in cooperation with the states; by states like Louisiana on state-owned lands; on areas like the national forests; or by the national government, on other areas, as has already been done along the Mississippi River and elsewhere. . . . .

"Louisiana is particularly well provided with large bird sanctuaries. Under State control there are the State Wild Life Refuge in Vermilion Parish, the Rockefeller Wild Life Refuge in Cameron Parish, and the Russell Sage Wild Life Refuge, these being valuable for the protection particularly of ducks and geese; the Singer Wild Life Preserve in Madison Parish; the Theo Terzia Game Preserve, the Ayers-Fisher Preserve, and the Northwest Game Preserve, all of which are valuable for the conservation of upland birds and other game. There are also the Rainey Wild Life Sanctuary in Vermilion Parish, administered by the National Association of Audubon Societies, and the Delta, Sabine and Lacassine Migratory Bird Refuges, administered by the Biological Survey. In addition the State parks, although small, are natural refuges for wild life; and the Pass a Loutre Hunting Preserve in the Mississippi River Delta is, of course, a refuge for all kinds of birds and other game at times other than the open hunting season.

"In addition to education and the protection of the breeding and feeding grounds of birds, intelligent restrictions of the hunting of waterfowl are of course vitally necessary. Notwithstanding all that has been accomplished in connection with the banishing of spring shooting and market hunting it may still be necessary further to restrict privileges of this sort, not only for the good of the birds but for the sake of preserving the supply for ourselves and for those who will fall heir to our advantages.

"All true sportsmen should put forth their efforts at all times to educate the public to proper enforcement of existing laws and to the general upbuilding of a spirit of true sportsmanship in all those who love outdoor life. Only in this way shall we be able to accomplish the greatest good not only for the wild life of our country but for ourselves."

Educational Values

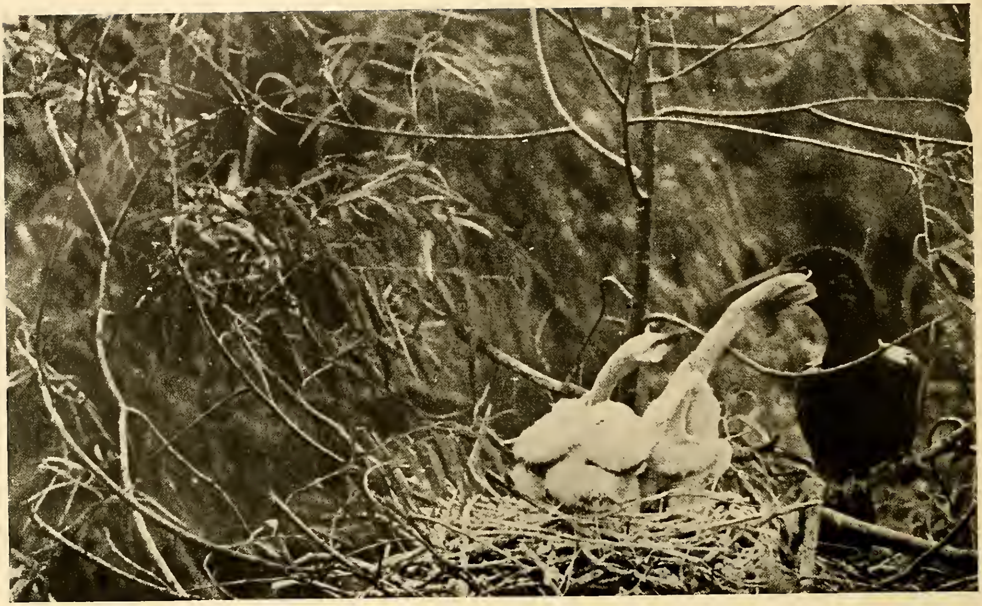
Though relatively few people know all the birds, everyone knows at least some of the bird species whose colors, songs and actions constantly arouse curiosity. The nature lover and the hunter, the agriculturist and the gardener, the teacher and the student, all find in various phases of bird life subjects of interest and of importance. Dr. Oberholser well expresses this as follows:

"All the wild life of the out-doors is of great value from an educational standpoint, because few, if any, things in life are more conducive to the proper training of the powers of observation than natural history. If for nothing else the wild things of the out-doors would be well worth preserving for this alone. Added to this is the great aesthetic value that the more beautiful and otherwise attractive of these have for man."

In addition to the great value of wild life from the aesthetic, educational, and recreational standpoints, there are many practical considerations of importance. In fact, the value of the products of out-door life is often greater than that of

(Photograph by Bailey and Dickinson.)

■ **The beautiful American Egret,** *Casmerodius albus egretta,* **here photographed beside its young, is a familiar Louisiana species.**



(Photograph by Bailey.)

■ **One of the young Anhingas or Snakebirds, *Anhinga anhinga,* is here shown in the act of securing food by inserting its head in the parent's mouth.**

crops that could be produced from the same areas under cultivation. Unfortunately, the wild life resources of our country are often considered merely as a mine to be exhausted rather than a crop to be nurtured and harvested. By careful cultivation, however, all these can be made to be increased by proper measures. Our wild fowl alone, for instance, produce each year, at a conservative estimate, at least many million dollars worth of food, besides all the revenue that accrues to those who have to do with furnishing the means of many kinds for carrying on the sport of hunting. The latter amount is probably many times greater than the actual food value of the birds obtained.

"The Bird Life of Louisiana" is illustrated with 45 full page plates, eight of which are in color. The black and white portraits are beautiful photographs of the birds in their native haunts.

The ever fascinating subject of bird migration is discussed in one of the general chapters of the bulletin, wherein are gathered many facts regarding some of the far and obscurely understood journeyings of our Louisiana birds. Dr. Oberholser particularly emphasizes the importance of Grand Isle as a station for the study of bird migration movements. He writes:

Bird Migration

"The mystery of bird migration is always attractive. Migration is one of the most distinctive features of bird life, and even yet is not fully understood. As commonly considered it is the regular seasonal movement of birds to and from their breeding grounds. Generally speaking, the origin of the migratory movement of birds, in North America at least, dates back to the time when the whole northern part of the country was covered with ice, and this naturally crowded southward the former tropical inhabitants. When the ice receded the birds reoccupied the uncovered areas but continued their migratory movements back and forth each year, even in places where the lack of food, which was one of the primary causes of their original exclusion from the territory, ceased to be a factor. This theory, however, does not fully explain the various kinds of migration, such as those of tropical sea birds that move regularly northward after the breeding season.

"In North America most of the migratory movements are southward after the breeding season, and northward in the spring. There is much variation, however, in the time of the beginning of these movements. Some species, like the Yellow Warbler and many species of shorebirds, begin to move just as soon as the actual season for nesting is over. Other species, like the Towhee and certain warblers, remain on their breeding grounds for several months after they are through breeding, and move southward only at the advent of cold weather.

"Similar variation exists in the distances to which birds migrate. Some kinds of birds, or at least a considerable proportion of the individuals that make up the species, may migrate only a few hundred miles, or even less, from their summer home to their wintering ground; and in some cases the migration consists chiefly of the descent of mountain birds to the adjacent lowlands. Some species, however, travel to a great distance, even several thousand miles, as, for instance, the shorebirds and some of the warblers that breed in the northern part of North America, which migrate to southern South America. Perhaps the longest migration of any bird is that of the Arctic Tern, which travels southward approximately 11,000 miles.

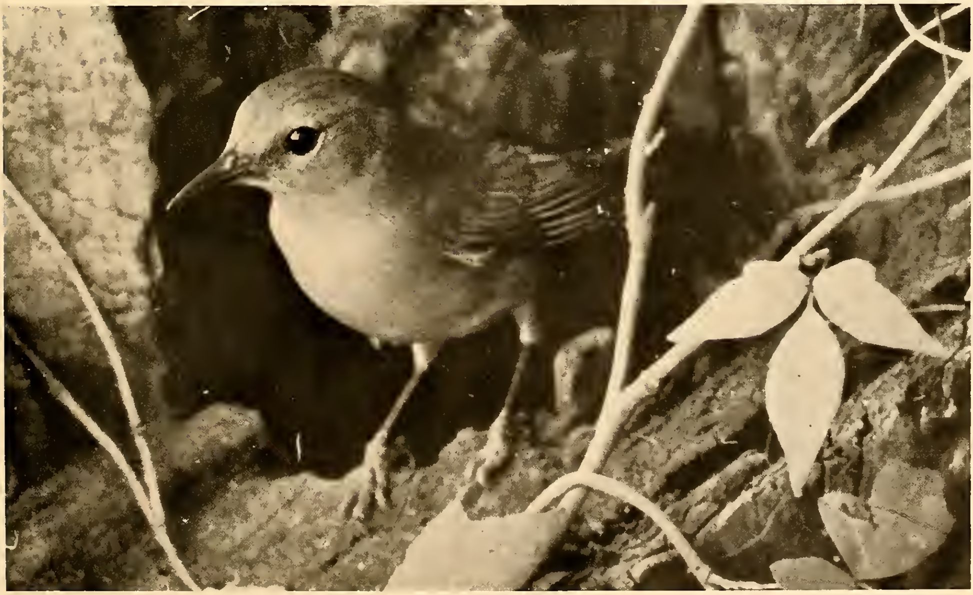
"In traveling these considerable distances the birds usually pursue a more or less regular route. Sometimes this route is a rather narrow lane, as it were, sometimes it is a broad area extending well across the continent; but generally speaking there are several more or less well-defined routes of migration between the United States and Central or South America. One extends southeast from the Arctic to about Labrador, and thence across the sea to South America; another along the Atlantic coast and across through the West Indies; another from the southern end of Florida through Cuba and across the Caribbean Sea to the northern part of South America; another across the Gulf of Mexico, from the southern part of the Gulf States to Yucatan and adjacent parts of Mexico, and thence southeastward through Central America to South America; another across the extreme western end of the Gulf of Mexico from Texas to Mexico; another through the Rocky Mountain region, and south through central Mexico; and still another along the Pacific Coast. There are many variations of these, and certain species have peculiar migration routes which do not conform to the general routes above mentioned, but which are entirely or partly different. It is of interest also that certain birds, like the Golden Plover, Eskimo Curlew, and Connecticut Warbler, do not use the same route in both spring and fall, but pass south usually by an eastern way, and on their return journey northward follow a route that lies much farther west.

"Certain birds migrate singly, others in flocks. Of some species the adults and young migrate separately, while of others they migrate in company. Many birds, like the hummingbirds, Chimney Swift, shrikes and swallows, migrate only or chiefly by day. Many others, such as various kinds of warblers and thrushes, travel almost exclusively by night, spending the days feeding along the way. The weather, undoubtedly, has considerable influence on the migration of birds, since a very heavy storm will probably delay the migration at the place where the storm is raging, and exceedingly cold weather in the spring will retard the beginning of migration whenever the low temperature exists at points where the birds might begin their migration journey. A more or less quiet and overcast night, however, seems to be an ideal one for the migratory movements of birds, and, on such occasions in favorable locations, large numbers may be heard passing over.

"The altitude at which migrating birds move has been a matter of considerable discussion. Certain species travel very close to the earth, or, at most, within a few hundred yards of it, and the greater number of the migrants ordinarily fly not over 2,000 feet above the ground. However, on certain occasions, birds ascend to higher altitudes, particularly from the necessity of passing over mountain ranges, and actual observations have been made of birds that were several miles above sea level, although, in these cases, not so much farther above the highest point over which they flew as might be expected from such a high elevation.

"The speed of migration is, of course, determined primarily by the limits of power of flight of the individual species, which varies greatly; and a distinction, of course, should be made between the distance that a single individual can fly and the average rate of progression of the species as a whole. Many individual birds, even small birds like the hummingbirds, can fly 60 miles per hour or more, and yet in migrating, the individuals of most species probably do not average more than 20 to 40 miles per hour. The average advance of the species, however, when a great distance is taken into consideration, and land birds only considered, probably will not average more than 40 to 70 miles per day, although the farther north the species reaches, and the later the season becomes, the faster the average daily advance. Many species, however, move even much more slowly than this, some perhaps under 20 miles per day.

"The most remarkable feature of migration, however, is the almost un-



(Photograph by Bailey and Dickinson.)

■ **The Prothonotary Warbler, *Protonotaria citrea*, is a charming inhabitant of Louisiana bottom lands.**

erring accuracy with which birds find their way, even across a wide expanse of water or a continent, at such an altitude that at night they would be unable to profit much by landmarks; and when it is considered that certain birds travel from their summer home perhaps 2,000 miles or more to their winter home and return, as has been proved by bird banding, to the same bush in the winter, it is evident that we are dealing with a more than ordinary occurrence. It is apparent that some hereditary impulse must guide them in their migration journeys.

"On these long travels it is inevitable that there should be many hazards, and the accidents to migrating birds are numerous and ofttimes disastrous. Sometimes millions of birds are killed by storms of one kind or another, as for instance on the plains, when sleet storms and ice storms descend on the migrating multitudes. Severe storms at sea, when land birds are migrating across the open water, almost invariably result in great loss of life, while lighthouses, monuments and even telegraph and telephone wires take a large toll of birds that are attracted by light, or dash against obstructions that they cannot see.

"While there is much that is not yet understood about the migratory movements of birds, the study of the various phases of this activity of birds is a very valuable aid to an understanding of the whole problem of behavior of birds.

"The coast of Louisiana, situated as it is in the central portion of the northern coast of the Gulf of Mexico, lies directly in the migration route across the Gulf of Mexico that is used by so many birds traveling from the Gulf States to Central and South America. On the Gulf shore, in southern Jefferson Parish, is situated Grand Isle, a sandy coastal island that, however, supports a considerable growth of live-oak trees. By reason of its position and apparent attractiveness to birds, it seems to be a port of call for large numbers of northward migrating small birds in the spring and their first stopping place on the edge of the mainland of the United States. Few places seem to be so advantageous for the study of the migratory movements of birds in the spring as does Grand Isle, and the large numbers of migrating birds that are to be found at this locality during the northward migration when weather conditions are right, are almost unbelievable. It offers an opportunity for further investigation such as is presented by few localities."

List of Publications of the Louisiana Geological Survey of the Department of Conservation.

Copies of Available Reports May be Secured at Quoted Prices. (Postage included in price.)

GEOLOGICAL BULLETINS

Geological Bulletin No. 1*

"Geology of Iberia Parish," by H. V. HOWE and C. K. MORESI, La. Dept. Consv., 1931, 187 pp., 15 maps, 3 photographs $1.00

(Includes discussions of the physiography with special reference to the Pleistocene terraces and to drainage; stratigraphy; historical and theoretical considerations of the salt domes and associated caprock; mineral resources; and a bibliography of 224 papers).

Geological Bulletin No. 2*

"Foraminifera of the Jackson Eocene at Danville Landing on the Ouachita," by H. V. HOWE and W. E. WALLACE, La. Dept. Consv., 1932, 118 pp., 2 maps, 15 plates.. $.40

(Approximately 125 species and varieties of foraminifera are described and illustrated with the erection of two new genera).

Geological Bulletin No. 3*

"Geology of Lafayette and St. Martin Parishes," by H. V. HOWE and C. K. MORESI, La. Dept. Consv., 1933, 238 pp., 22 maps, 31 photographs, 2 plates $1.00

(Under physiography the Pleistocene terraces, Mississippi River meanders and drainage are given special attention. Stratigraphy, salt domes and prospective domes are also discussed. The bibliography contains 141 references).

Geological Bulletin No. 4

"Louisiana Sabine (Wilcox) Eocene Ostracoda," by H. V. HOWE and J. B. GARRETT, JR., La. Dept. Consv., 1934, 65 pp., 1 map, 4 plates .... $.40

(31 species of ostracods, 25 of which are new, are described and illustrated from four Sabine localities).

Geological Bulletin No. 5

"Louisiana Jackson Eocene Ostracoda," by H. V. HOWE and JACK CHAMBERS, La. Dept. Consv., 1935, 66 pp., 6 plates .... $.40

(43 species of ostracods from 17 localities are described and illustrated).

Geological Bulletin No. 6*

"Reports on the Geology of Cameron and Vermilion Parishes," by H. V. HOWE, R. J. RUSSELL, J. H. McGUIRT, B. C. CRAFT and M. B. STEPHENSON, La. Dept. Consv., 1935, 225 pp., 34 maps and illustrations $1.00

(Pleistocene Mississippi River deltas, cheniers, gulf coast subsidence and isostatic data of Mississippi sedimentation are discussed under physiography. Salt domes and prospects; mineral development; descriptions of some *Potamides matsoni* zone microfossils, lists of maps and references are also included in the bulletin).

Geological Bulletin No. 7*

"Louisiana Vicksburg Oligocene Ostracoda," by H. V. HOWE and JOHN LAW, La. Dept. Consv., 1936, 96 pp., 6 plates. .... $.40

(Three new genera are set up in this bulletin that describes and illustrates some 75 species of ostracods from 30 localities).

Geological Bulletin No. 8

"Lower Mississippi River Delta; Reports on the Geology of Plaquemines and St. Bernard Parishes," by R. J. RUSSELL, H. V. HOWE, J. H. McGUIRT, C. F. DOHM, F. B. KNIFFEN and C. A. BROWN, La. Dept. Consv., 1936, 454 pp., 53 maps and illustrations $1.00

(Includes reports on the physiography of Lower Mississippi River Delta; salt domes, bibliography of 41 pages, list of maps; petrographic analysis of two Mississippi River subdeltas and pebbles of Chandeleur Islands; Recent molusca; Indian Mounds and the vegetation of Indian Mounds and marshes).

Geological Bulletin No. 9

"Geology of Catahoula and Concordia Parishes," by W. D. CHAWNER, La. Dept. Consv., 1936, 232 pp., 34 maps and illustrations................ $1.00

(Report of the geography and physiography of the alluvial valley of the Mississippi River, the upland terraces and hill country. Colored geologic map with discussion of surface outcrops and stratigraphy. Chapter on economic and petroleum geology. List of maps and bibliography of 15 pages).

Geological Bulletin No. 10

"Geology of Grant and La Salle Parishes," by H. N. FISK, La. Dept. Consv., 1938, 246 pp., 50 maps and illustrations $1.00

(Report of the geography and physiography of the alluvial valley of the Mississippi River, the upland terraces and hill country. Colored geologic map with discussion of surface outcrops and stratigraphy. Chapter on economic and petroleum geology. List of maps and bibliography).

ANTHROPOLOGICAL STUDIES

Anthropological Study No. 1

"Ceramic Decoration Sequence at an Old Indian Village Site Sicily Island, Louisiana," by J. A. FORD, La. Dept. Consv., 1935, 41 pp., 17 illustrations .... $.20

Anthropological Study No. 2

"Analysis of Indian Village Site Collections from Louisiana and Mississippi," by J. A. FORD, La. Dept. Consv., 1936, 285 pp., 50 illustrations and maps .... $.50

(The development of a chronology based principally on surface collections; detailed description of the principal sites and site collections; the characteristic features of the several pottery complexes represented in the area. Bibliography and glossary).

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* OUT OF PRINT.

Louisiana Natural Resources Go Places!

(Continued from Page 30)

to bid it all goodbye, but soon we were on our way to Philadelphia, cradle of American liberty.

Choking down breakfast, our party took cabs and rushed to Independence Hall, where we saw the famous Liberty Bell.

At Baltimore we were received by members of the Chamber of Commerce, who took us through the city and to historic Fort McHenry.

We were given a warm welcome by the civic associations of Washington. Reporters and camera men had it all their own way for a little while and the result was seen in the next issues of their papers.

On Sunday we took a motor trip to Mount Vernon (where we had luncheon that was served by pretty waitresses dressed in Martha Washington costumes) over the George Washington Highway, along the banks of the historic Potomac River. We visited the Lee Mansion and the tomb of the Unknown Soldier. Returning from Mt. Vernon over the new Memorial Highway, we paused at the beautiful Lincoln Memorial. Next we visited the Government Buildings, the White House, the Pan-American Union, the Bureau of Engraving and Printing, the National Museum, the Smithsonian Institute, the United States Capitol and Congressional Library.

Pittsburg gave us a thrill! Mountain drives high up on this side and high up on that! A wonderful sight!

Cincinnati's Union Terminal is—it MUST BE—one of the grandest stations in the world. Its huge lobby and broad concourse, with their colorful murals and paneling, are breath taking. Surely, it is the last word in railroad terminals!

A trip to the Rookwood Pottery and a glimpse of the beautiful Hall of Mirrors (Netherland Plaza Hotel) finished our time and soon we were on our way through the foothills of Kentucky to Louisville, where we were greeted with true Southern hospitality by members of the Board of Trade.

After a short drive, we went to the handsome Kentucky Hotel for cocktails and luncheon. Spying a piano, our maestro, Henry Wehrman, soon had us all singing "My Louisiana", "Old New Orleans", "Goodnight, Ladies", and of course, "My Old Kentucky Home." We then went by motor to a famous distillery, to the race track at Churchhill Downs and for a drive through Louisville's beautiful parks.

Our train ran smoothly on, but alas! our party dwindled in numbers. There was scarcely a handful left when we reached the Union Station here in New Orleans. Our days on tour were happy ones, but it was mighty fine to be home again—in dear old New Orleans, America's Most Interesting City.

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The Gun Perforator

(Continued from Page 33)

stage cementing is done before original completion it is not likely that a rig will have to be moved back to the location in order to tap one of the prepared sands in reserve. A bridging plug may be set just below the chosen sand by a gun perforator truck to prepare the well for production through perforations opposite the new zone.

Control of High Gas Pressures

The gun perforator also has uses which are helpful in the drilling of a well. One particular service that it may render is in the control of high gas pressures when there is evidence of a tendency to blow out around the casing which has been set. Perforating will enable the operator to hold the gas in check with heavy mud under pressure until a cement seal has been obtained. A cement squeeze job is effected through the perforations to seal off the offending gas zone.

The perforator may also be used in attempts to establish circulation in cases where the drill pipe or casing has become stuck. In many cases the establishment of circulation is the keynote in freeing stuck pipe.

The safety with which the gun perforator operated has led to its use in extreme conditions. It has been found that zones having very high pressures can be put on production safely by perforating under pressure. The casing is set through the sand and thoroughly cemented. The hole is loaded with heavy mud. Further restraint is added by running the gun through a blow out preventer, which is standard equipment on the service truck. Using this method, the highest pressures may be held in control until suitable surface connections can be made.

Remedial Work On Old Wells

In remedial work on old wells the gun perforator is invaluable. Much benefit can be obtained even without the use of a drilling rig. Clogged screens may be perforated so that production will be resumed. Tight or clogged formations may be made to produce by creating drainage through the holes and crevices resulting from gun perforation of formation. Many lime formations are made productive through the use of acids. The acid can be made much more effective by presenting a larger surface for its reaction. This can be done by the gun perforation of the formation. Due to resulting holes and fissures, the area exposed to the action of acid is greatly increased.

Besides these applications there will be many more as present drilling problems are solved, for the successful application of an effective tool often suggests adaptations of those methods. The Lane-Wells, in offering the gun perforator service, also offers technical aid in the utilization of the tool in the solution of complex problems arising in the drilling and production of oil wells.

* * *

Young Birds Carried By Their Parents

There are two Louisiana species of birds that bear their young through the air; by the neck in the mother's beak, between the mother's feet and on the mother's back.

The woodcock was noted clasping her young between her legs and carrying them off, one by one.

* * *

The Redfish

The redfish, Sciaenops Ocellata, also called red drum and channel bass, and its young "rat red," should not be confused with the red snapper, which belongs to a remote family, the snapper, Lutianidae.

Although mature and breeding by the end of its fourth year, when about 30 inches long, the redfish may reach a length of five feet and weight of 75 pounds.

* * *

The Water Moccasin

The water moccasin cannot strike in the usual way while under water, but if one steps on it and pins it down so that it cannot escape it will bite in self defense and may inflict a serious wound.

Big Increase In The Duck Population . . .

With the extension of the duck hunting season from 30 to 45 days, and allowance of a two- days' bag limit in possession, Louisiana hunters are looking forward to the best season they have had in some years.

Restrictive regulations and intensive educational efforts, combined with the spirit of co-operation on the part of the majority of duck hunters, has resulted in a considerable increase in the number of ducks and wild geese—estimated as high as two-thirds increase since the 'waterfowl depression.'

These migratory waterfowl find in Louisiana their ideal Winter resort—the most extensive combination of water and marsh-land, feeding and resting grounds, to be found anywhere in America.

Louisiana was a pioneer in the protection of its wildlife and has been continually stepping ahead in this important phase of conservation.

To-day there are approximately three-quarters of a million acres dedicated as wildlife sanctuaries in Louisiana, besides millions of acres that enjoy a de facto state of protection through the co-operation of land-owners with the Department of Conservation.

DEPARTMENT OF CONSERVATION

State of Louisiana

The Governors Are Looking This Way

At the recent freight rate hearings instigated by nine Southern governors, seeking to establish a parity of rates on Southern products with those of the North over East and West railroads, the Northern governors complained rather bitterly, at the Buffalo (N. Y.) hearing, that the more favorable climatic and labor conditions of the South entitled them to an offset in freight rates.

While the validity of the claim was not recognized, it was interesting to note this admission on the part of the Northern governors that the climatic and labor conditions of the South are important factors in its industrial development.

In the case of Louisiana, however, there are other advantages that appeal to the alert investor and industrialist. The natural resources of Louisiana are more varied than those of any other state of the Union, which insures a continuous supply of the raw materials essential to industry. Louisiana's present and potential supply of natural gas insures cheaper fuel; its intricate system of inland waterways will provide cheaper transportation to the consuming centers.

As a further inducement Louisiana offers tax exemption to new industries for the period of ten years; and as a result of Governor Leche's industrial campaign many new industries have been located in this State.

It is not difficult for us to sympathize with the Northern governors in their loss of industry. We had our own bitter days of Reconstruction following the War Between the States, when all industry was stagnant, and it is perhaps inevitable that the wheel of fortune should turn.

Louisiana is a liberal state, looking forward, not backward, and we invite the men of vision and enterprise, wherever they may be, to turn their eyes in this direction.

DEPARTMENT OF CONSERVATON

State of Louisiana

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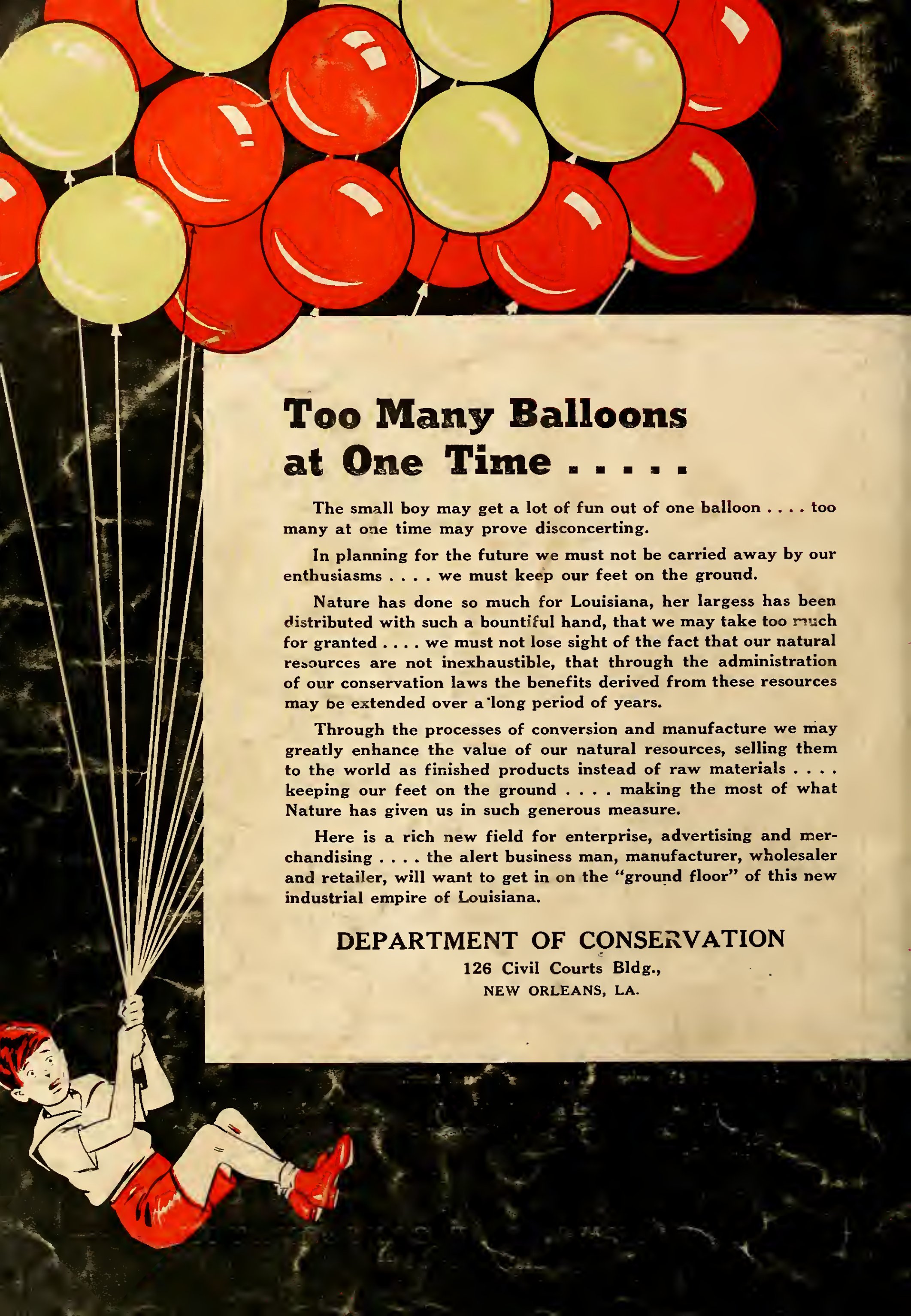

Too Many Balloons at One Time . . . . .

The small boy may get a lot of fun out of one balloon . . . . too many at one time may prove disconcerting.

In planning for the future we must not be carried away by our enthusiasms . . . . we must keep our feet on the ground.

Nature has done so much for Louisiana, her largess has been distributed with such a bountiful hand, that we may take too much for granted . . . . we must not lose sight of the fact that our natural resources are not inexhaustible, that through the administration of our conservation laws the benefits derived from these resources may be extended over a long period of years.

Through the processes of conversion and manufacture we may greatly enhance the value of our natural resources, selling them to the world as finished products instead of raw materials . . . . keeping our feet on the ground . . . . making the most of what Nature has given us in such generous measure.

Here is a rich new field for enterprise, advertising and merchandising . . . . the alert business man, manufacturer, wholesaler and retailer, will want to get in on the "ground floor" of this new industrial empire of Louisiana.

DEPARTMENT OF CONSERVATION
126 Civil Courts Bldg.,
NEW ORLEANS, LA.